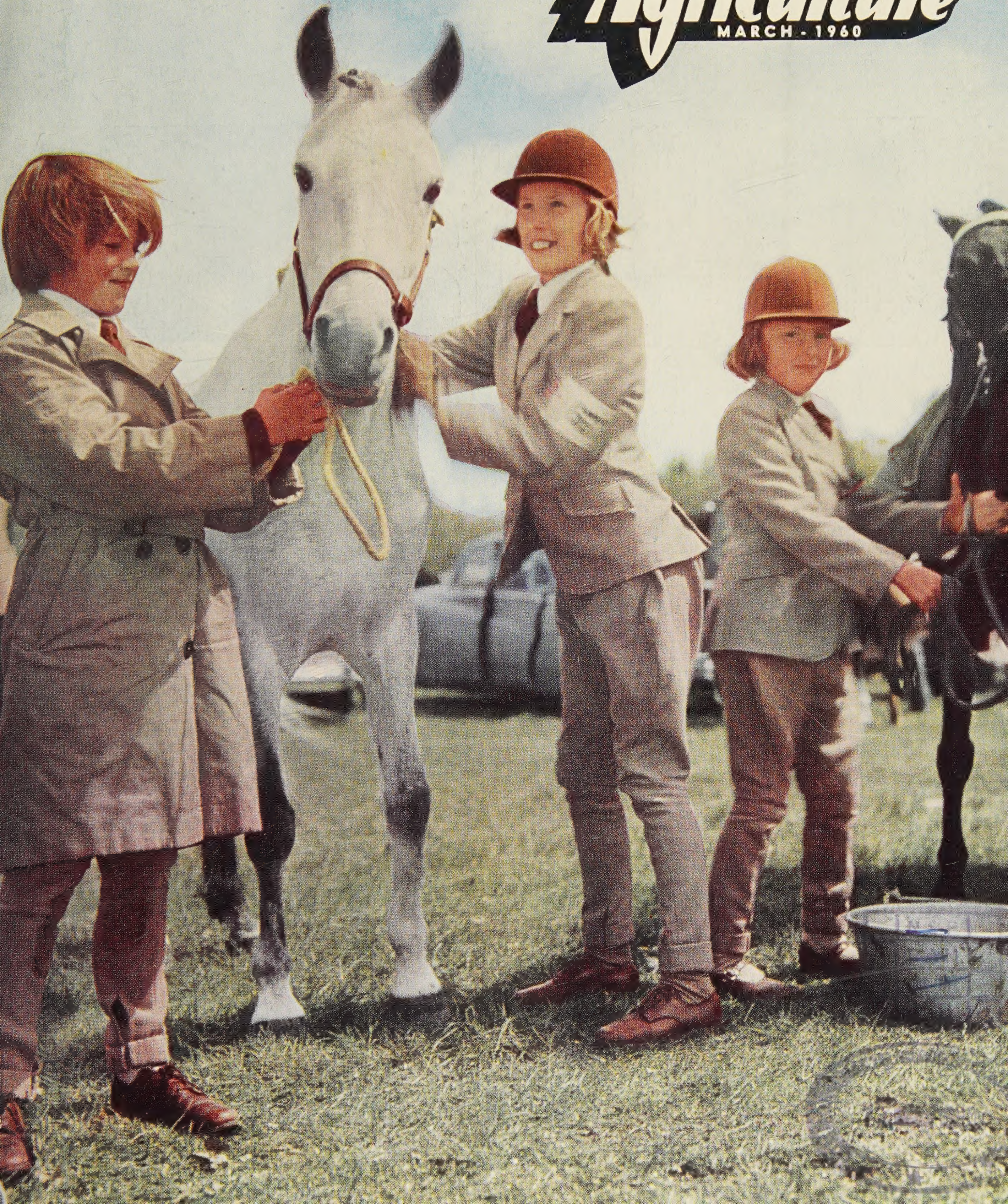
NEW ZEALAND
JOURNAL OF
Agriculture
MARCH - 1960



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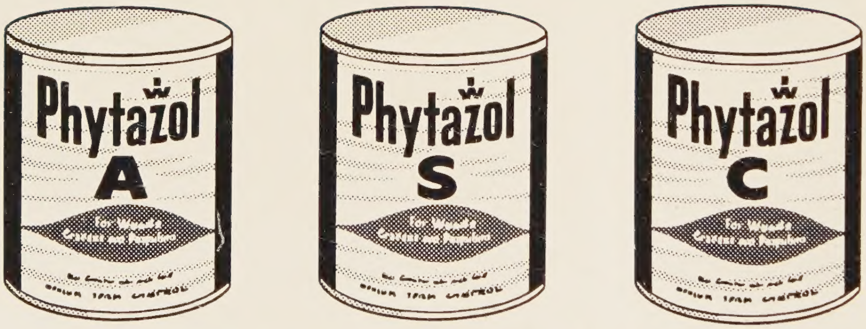

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Volume 100
Number 3
15 March
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NEW ZEALAND JOURNAL OF Agriculture

(Established 1910)

Published by
Direction of
Hon. C. F. Skinner,
Minister of Agriculture

CONTENTS

Sheep Management in Rotorua-Taupo	C. R. Taylor	210
Grading Points for Export Butter and Cheese		216
Dairy Produce Graded for Export		216
Tractor Rolling for Pasture Establishment	L. W. Blackmore	217
Weed Identification and Control: Broom	L. J. Matthews	229
Recent Research Work		230
Weed Control in Lucerne	F. A. Meeklah	231
Round the Research Stations		234
Care of Livestock during April		236
Establishing and Topdressing Pastures (Seasonal Notes)		237
Duck Farming in New Zealand	F. C. Bobby	239
Propagation of Lilac	T. W. Rawson and K. H. Marcussen	243
Show Dates		244
Purua Foot Rot Scheme	A. Briscoe Moore and C. R. Ensor	245
Pig Housing: Its Influence on Production	E. D. Edwards	251
The Home Garden in April	A. G. Kennelly	259
Autumn Work in the Domestic Apiary	D. A. Briscoe	263
Meteorological Records for January		264
International Action in Trade in Agricultural Products	J. V. White	265
A Hay Barn for Hill Country	J. D. Currie	277
Crop Production: Wheat	E. G. Smith	280
Radio Broadcasts for Farmers		290
Wool Sales		290
Factors Affecting Honey Quality	R. S. Walsh	291
Silk—Its Characteristics and its Care	Maud B. Strain	294
Warm Winter Overalls for Children	Maud B. Strain	300
Growing Calceolarias	J. B. Laurenson	302
The Flower Garden:		
Camellias	J. S. Say	303
Work for April	Joy Watkins	310
A Quilted Hot Water Bottle Cover	Judith Ferrier	312

[*Mannering and Donaldson*

A continuous decline in the use of horses on farms, even of riding horses in recent years, has not affected the interest in horse events at agricultural shows. In fact in many centres entries continue to rise owing to the interest promoted by the horse and pony clubs. The young competitors and their mounts shown on our cover this month were some of the many who took part at the Ellesmere A. and P. Association's show at Leeston last October.

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The "Journal" is issued monthly. The subscription within New Zealand is 10s. a year; the overseas subscription is 13s. (sterling). Subscriptions can be paid directly to any office of the Department of Agriculture, or the "Journal" may be ordered from any bookseller or newsagent. Individual copies are available from Publications Section, Department of Agriculture, P.O. Box 2298, Wellington, at 1s. a copy, post free.

Subscribers' inquiries (preferably accompanied by the address cut from a recent "Journal" wrapper) should be sent to the nearest office of the Department of Agriculture.

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REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE

Sheep Management in Rotorua-Taupo

By C. R. TAYLOR,
Instructor in Agriculture, Department of Agriculture,
Rotorua

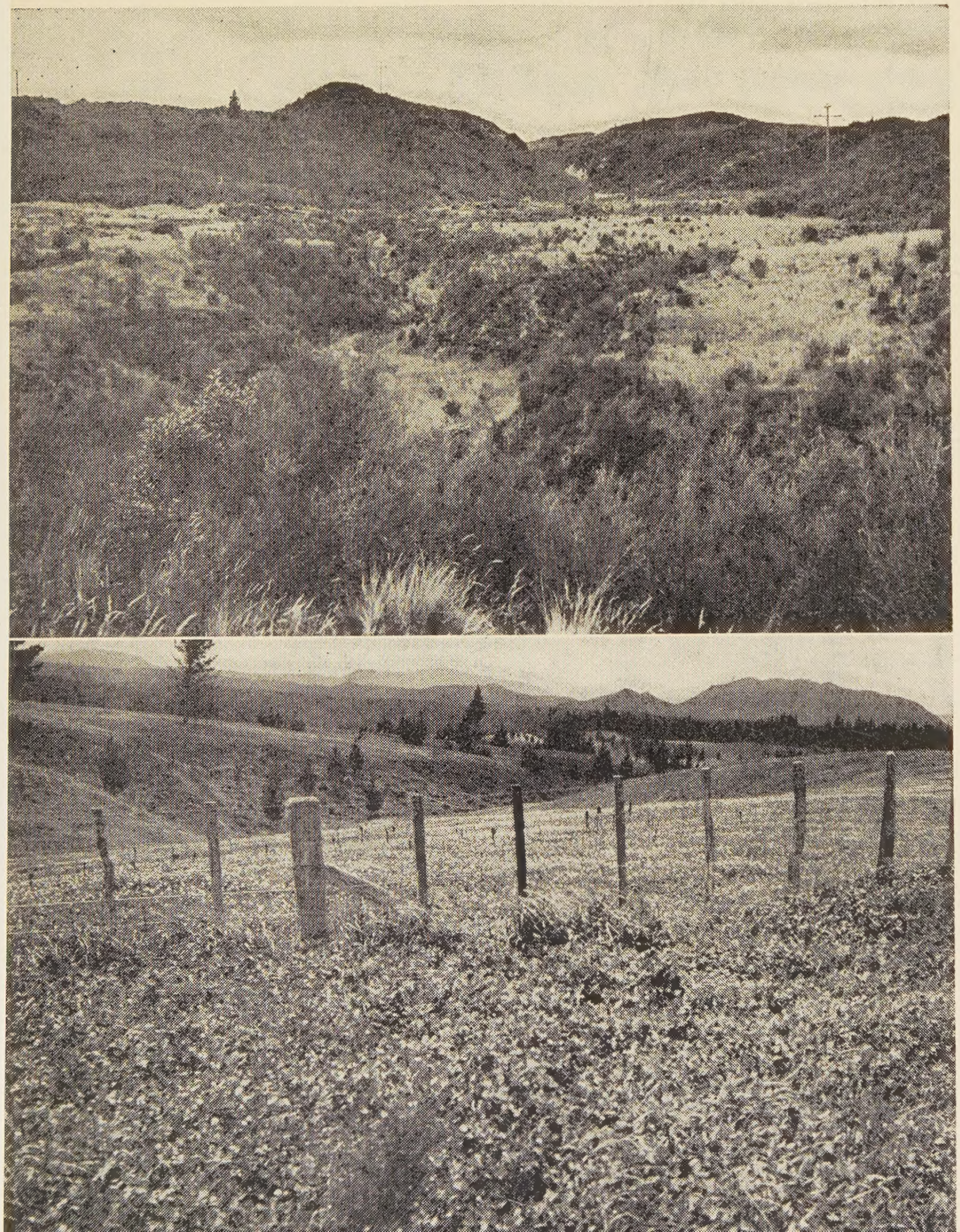
BECAUSE of their availability and comparative ease of handling, vast areas of waste scrub land comprising much of the pumice country of the Rotorua-Taupo region are being developed for settlement at a greater rate than all other similar projects combined. To keep up a reasonable development pace, 15,000 to 20,000 acres must be settled each year; so far this settlement has usually been by returned servicemen, but occasionally civilian farmers have been successful in ballots.

NATURALLY, many of these settlers from various parts of the Dominion find conditions strange at first and take a little time to settle down to an entirely fresh farming experience. Some, of course, are able to adapt themselves to their new environment more readily than others, but most seek some guidance and draw benefit from it in the first year or two, and it was primarily in answer to these requests for guidance that this article, which does not cover every aspect of pumice country sheep farming, was prepared.

General Observations

As with dairy farming the main aim should be production per acre and not production per ewe. This must involve some small reduction in wool and lamb weights per ewe, but the overall production of wool and lamb from a greater number of ewes carried per acre means substantially more in total production of these items per acre, hence more income per acre.

This is essentially a long-term project and should not be attempted as a sudden build-up in ewe numbers. Only as soil fertility increases, yielding greater pasture production, is it safe to carry additional ewes with which to utilise the progressive increase in pasturage. At no time is it sound policy to semi-starve stock merely to carry numbers in excess of a farm's capacity. Of course, it is equally unsound policy to understock consistently, thereby failing to utilise fully the productive capacity of pastures brought about through good methods of pasture management.



← Upper—Pumice scrub land in its virgin state. Hundreds of thousands of acres in this condition have been successfully developed for settlement in the Rotorua-Taupo region. Lower—After initial development pumice land permanent pastures are almost invariably very clovery and somewhat difficult to manage. Stock health and production often suffer as a result. Adequate subdivision and stocking rate are most important factors at this stage and largely provide the answer to temporary unthrift in sheep and cattle.

Carrying the maximum number of ewes per acre with an adequate number of supporting breeding cows means not only a greater total quantity of salable products per acre, but also ensures the maximum utilisation of pasturage, something that has been produced at considerable cost and therefore should not be wasted.

Seasonal periods of low pasture production are inevitable on most properties (for example, in winter and, occasionally, certain summer months). Since breeding stock are the profitable animals on most farms, extreme care should be taken to avoid having so many dry stock on hand at critical feed periods that the welfare of breeding animals is seriously affected. To do so is the simplest and quickest way to bankruptcy.

Aim to provide 15 to 25 watered paddocks as soon as possible. These are necessary to facilitate proper stock management over the year and adequate control of pastures, especially the clovery swards so characteristic of pumice country scrub land for the first few years after development and which appear mainly responsible for unthriftiness in stock.

Subdivision

When subdividing it is usually best to separate sunny from shady faces as much as possible. Proper grazing control of all pasturage is thus facilitated and carrying capacity increased. Paddocks consisting chiefly of shady faces are usually ideal for summer grazing, and if closed in December-January, are often invaluable for flushing from mid February, when pasture growth on the sunny faces is scarce owing to the hot, dry weather.

On the other hand in winter and early spring the shady faces are often neglected by stock wherever they are given a choice of grazing through both aspects being in the same paddock. This not only wastes feed, but brings about gradual deterioration of pasture from overgrazing of the sunny faces and undergrazing of the shady slopes. Proper subdivision largely avoids this disadvantage.

Another important point in any programme of subdivision is to keep together as much as possible all mowable areas in one or more paddocks, and likewise the unmowable areas. This system not only facilitates hay and silage making, but it also—

(a) Generally eases grazing management throughout the entire year, and

(b) Can be especially useful during periods of excess growth (for example, in late spring-early summer) when the mower can be made to do the work of many extra cattle or sheep, thus enabling all paddocks to be kept in good order with a minimum of waste pasturage.

The idea of a race-paddock or a conventional race capable of giving access to several paddocks is commendable wherever it can be adopted. Access to paddocks only through other paddocks is a bad form of subdivision and should be avoided if possible.

Role of Cattle

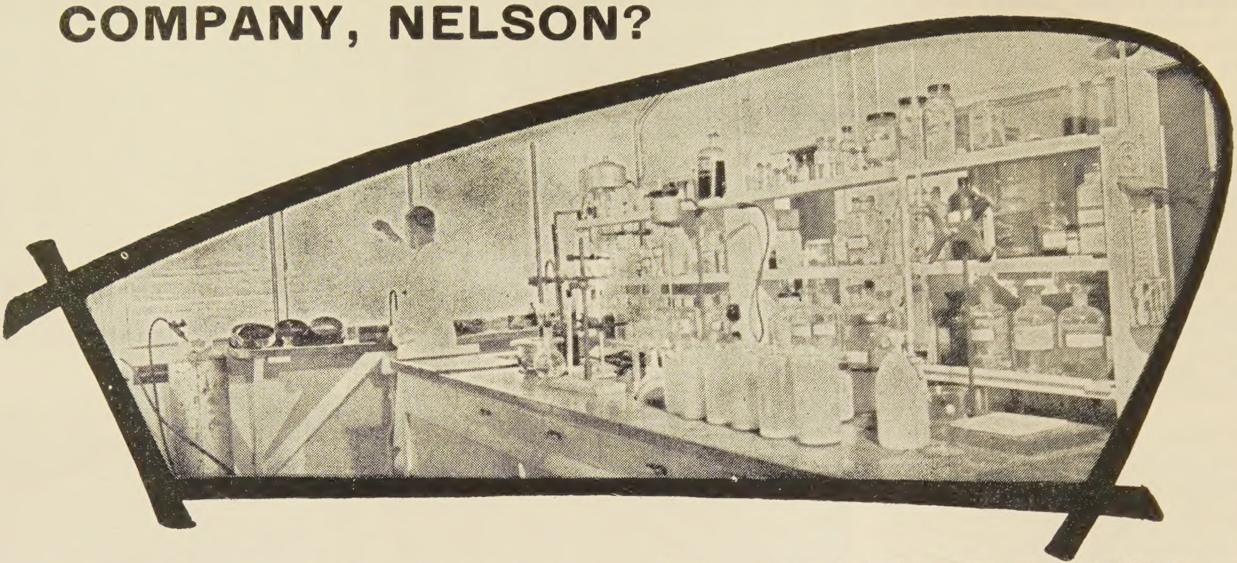
Since sheep (wool and lambs) provide the major portion of a sheep farmer's income, it is only natural, perhaps, that a large percentage of farmers should seem to have a greater leaning toward sheep than cattle. Though the function of cattle is for the most part a subsidiary one, it nevertheless is a vital one in the management of the average sheep unit. Especially is this so in the early years of farming recently developed pumice country when a strong, vigorous growth of red clover and cocksfoot has to be properly controlled for the benefit of sheep health and thrift, often with insufficient facilities, such as subdivision.

Over this period it is usually necessary to carry a higher proportion of cattle to sheep than later when the pastures have settled down to their more normal composition of ryegrass-white clover-cocksfoot-crested dogstail, etc., rather than the cocksfoot-red clover dominant swards that settlers usually take over on settlement. In time cattle numbers tend to remain steady or can even be reduced slightly in some circumstances, while sheep numbers are increased with the build-up in soil fertility and consequent greater pasture production. This is as it should be and not the reverse process.

The principal role of cattle is to clean up and prepare paddocks ahead of the ewes and lambs so that the sheep obtain the reasonably short, fresh, clean feed which is so much to their liking. All too often cattle are farmed in a manner almost as though the sheep did not exist on the property; this is bad farming and certainly is not the reason for having cattle on the farm.

Upper—After a few years, provided management has been reasonable, pastures on pumice country settle down to a more or less ryegrass-cocksfoot-white clover sward with some crested dogstail, Yorkshire fog, and a little browntop. This sward well suits sheep and cattle. Lower—Sheep grazing on old established pumice country originally developed from fern and low scrub. This farm has a consistent record of production of quality fat lambs.

WHAT'S NEW FROM FARM CHEMICALS COMPANY, NELSON?



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Ewe Management

After weaning (mid December-early January) mob stock all ewes with the two-point purpose of keeping down excess condition and cleaning up rough pastures, weeds, etc., that may have got away when lambs were running with ewes.

> **From this time up to three weeks or so before tupping and for a short period after tupping, say 20 weeks in all, is about the only time in the year when breeding ewes can be regarded as unpaid farm workers.**

For most of the remainder of the year they are star guests and must be treated as such. Full advantage should therefore be taken of this brief period to get as much work out of the breeding flock, to the benefit of the farm, as possible.

> **Do not overdo this cleaning up process, as ewes in poor condition are likely to be shy breeders and otherwise troublesome.**

Preparation for tupping should start three weeks before rams are turned out. Separate two-tooth ewes from others and continue to mob graze in two lots. Full utilisation of pasture growth on specially saved paddocks at this stage should not be the object, as the idea is to flush ewes and restore body weight lost during cleaning up pastures, weeds, etc.

Flushing should be continued three weeks into the tupping period (six weeks in all), and then grazing management tightened to conserve feed and prevent excessive weight increase.

The date of putting out rams requires deep consideration. Experience indicates that the bulk of ewes lambing in good weather and on growing spring feed receive fewer setbacks than those lambing earlier under poor climatic and growth conditions. Thus, in the Rotorua-Taupo districts a late August-early September lambing could be expected to produce a better milking ewe and fewer lamb losses than early August lambing. **Moreover, ewes—especially two-tooths —are likely to take the ram more readily after the first heat period is allowed to pass, thus giving a better and more uniform lambing.** Lambs of more or less even age are also much more easily handled afterward.

There is appreciable experimental and other evidence to show that rams should all be put out together provided ewes are in the right condition. For every 100 two-tooth ewes it is advisable that at least three four-tooth or older rams be used. Before being put out with the ewes rams should be in good health and free from any trace of foot rot.

Young, two-tooth rams are too inexperienced for two-tooth ewes. For older ewes two to two and a half two-tooth and older rams per 100 will usually be enough. Some degree of movement (not actual mustering) of ewes and rams under mob-stocking conditions will facilitate good mating, especially if mobs are stirred up a little in the morning and again in late afternoon. No trouble within reason should be regarded as too great at this time of the year, as much depends on the thoroughness of this important job.

Instead of this method just described the long-standing and well tried technique of putting out 2 per cent of rams for two weeks and then withdrawing 1 per cent and replacing with 1 per cent fresh rams could be adopted.

When the rams are withdrawn, say, after 10 to 12 weeks, combine once again the two flocks of ewes—that is, the two-tooths and the older sheep—and run them as one mob again, since well done two-tooth ewes should winter as well as mature ewes. If the two-tooths do not appear to be doing well, some preferential grazing treatment may be desirable, but usually this should not be necessary.

From mid April onward grazing management should aim at spelling as many paddocks as possible to provide early spring feed for ewes and lambs —hence the need for an adequate number of paddocks. This means doing the ewes a little harder on the rougher paddocks, leaving the best areas to grow pre-lambing and lamb feed. If possible, at least a third of the farm should be treated in this way; more would be better if it could be managed.

From mid April until six weeks before lambing a slightly reduced level of nutrition due to the shutting up of lambing paddocks will not harm the ewes. However, for five to six weeks before lambing, ewes must be given a rising level of nutrition if sleepy sickness and other pre-natal troubles are to be avoided. This is when saved autumn grass consisting substantially of ryegrass comes in useful, as one of the principal weaknesses of newly developed pumice country is its clover dominance at this stage (see the lower illustration on page 210).

About three weeks before lambing begins (say, from the end of July) divide ewes into early and late lambing mobs and set-stock on the autumn-saved pasture with three to four ewes per acre, depending on the feed position, until weaning, usually some time in December or early January. The early lambing ewes should be put on to the best saved pastures while the later lambing ones could be set grazed more thinly, if necessary, on clean but poorer paddocks. All dry ewes should be in this latter group.

The separation of ewes into early and late lambing mobs ensures:

(a) Early lambing ewes getting the best of the saved feed.

(b) Easier shepherding.

(c) Easier docking, and

(d) That all dry ewes are in the late lambing paddocks and thus can be more readily removed later.

Sometimes it may be necessary to shift a set-stocked mob or part of a mob because the initial stocking rate for a particular area has been at fault, but this should be avoided as much as possible if the advantages of set-stocking ewes and lambs are to be preserved. With experience there should be little difficulty in assessing the carrying capacity of individual paddocks for various periods in the year.

Where conditions are suitable, especially with good access from paddock to paddock coupled with adequate feed in sufficient paddocks, etc., the system known as "shedding" may be used to advantage during lambing. In any case ewes with twin lambs should be shed wherever practicable and given preferential treatment in feed supply.

During the lambing period do not fail to make regular rounds of inspection, even at the expense of other important work, if necessary. **Poor shepherding frequently accounts for more lamb deaths between birth and docking than do various diseases.** Make sure newly born lambs get a proper feed before leaving them, as starvation causes many lamb deaths. Remember, these preventable losses are seriously reducing your profit. You have to safeguard your own interests.

Dock early rather than too late, as lambs suffer less set back if dealt with at an early age. Carefully select the right weather for docking and ensure complete cleanliness to avoid the risk of blood poisoning and other disastrous diseases common to this operation.

Watch for pulpy kidney, especially in single lambs, and other complaints that take their toll of lambs up to the time of weaning. If in doubt, call in a veterinarian for advice.

Aim at shearing ewes and weaning lambs before the middle of December if possible. Well done lambs are better weaned fairly early, but can be kept on ewes a little longer if feed is plentiful. On completion of weaning ewes can again be "mobbed" and moved around the farm to clean up rank pasture growth, fern, weeds, etc., until just before tupping. This is when ewes can do a great job on the farm instead of being nursed, but weaning should not be left too late if the ewes are to be used really effectively on control of ragwort and fern. All too often it has been noted that pumice country sheep farmers leave weaning too late because of the ample feed usually available during December and

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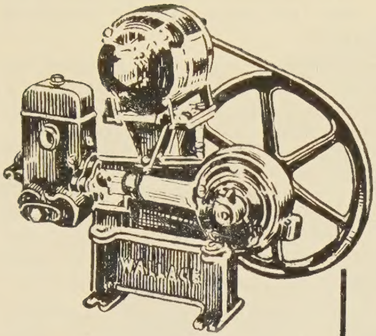

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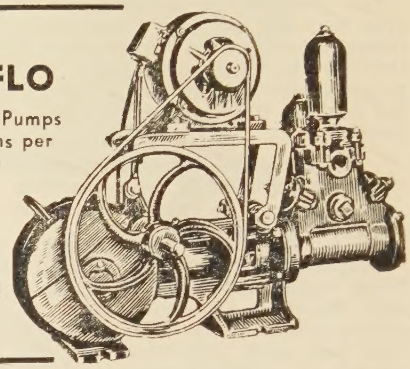

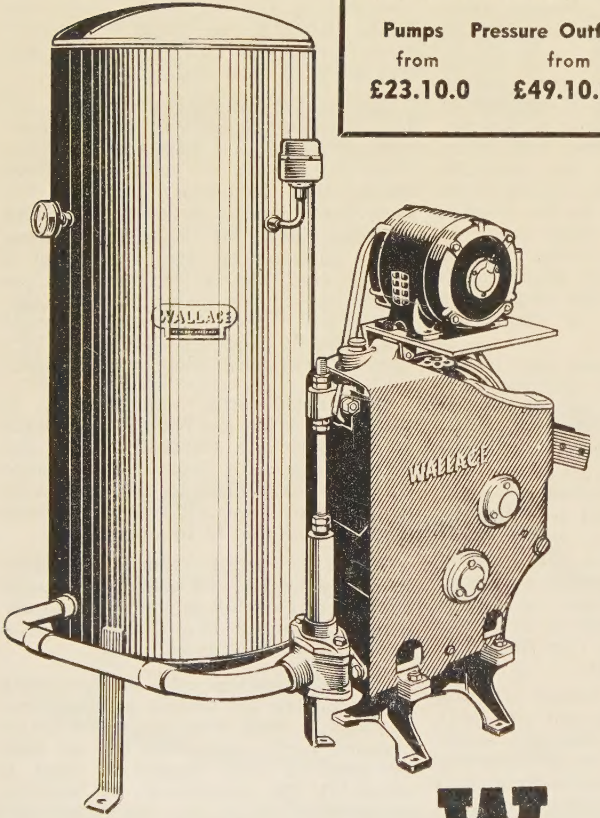

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January. Lambs rarely do any better because of this; ewes fatten too readily, resulting in gross over-weight at tupping time; while pastures become rank and unpalatable due to light, selective grazing. Early weaning and mob stocking are the answer to these problems.

At time of shearing culls should be identified and disposed of at the first favourable opportunity. Some reasons for culling would be:

(a) Dry ewes two years running, from whatever cause.

(b) Poor constitution, faulty jaws, udders, etc.

(c) Unsuitable conformation or wool type.

(d) Disease.

Some time in January cast-for-age ewes should be picked out and freshened up for a few weeks in readiness for sale. There is no point in keeping these rejects too long, for with the hot weather coming on feed may not be too plentiful for a time and the weaned lambs will know how to deal with what there is of any clean, fresh growth.

All ewes remaining after culling and selling are completed should follow the lambs by mob grazing as required. They must, however, be kept in good store condition, but loss of condition is not usual at this time of year—generally the reverse.

Bought-in ewes (usually two-tooths where this system is practised to replace or partly replace culled ewes) should be carefully inspected and selected before purchase. There is no point in farming mediocre sheep.

Lamb and Hogget Management

Throughout November and December in the pumice country feed usually outgrows animal needs and their ability to control it. This is the golden opportunity, if sufficient paddocks are available, to take out of use a few suitable matured pastures and shut them up for weaning feed. These paddocks, if practicable, should be close to the homestead so that they can be closely watched for a time. Separate lamb sexes whenever possible and set-stock each mob until lamb shearing.

If growth gets away on these saved paddocks before lamb feeding, graze off with cattle, not other sheep.

Draft as fats all possible wether lambs either off the mothers or before lamb shearing, which usually is about Christmas time or a little later in the pumice country. Those left on hand should be shorn with the ewe lambs and disposed of as soon as possible, thought being given to the existing feed situation and live weights of lambs, etc.

If suitable feed is plentiful and there is no risk of adversely affecting all lambs and other sheep through semi-starvation occasioned by dry weather and lack of pasturage, etc., all wether lambs can be retained until after lamb shearing before the "fats" are sold. This system is often more profitable than that of disposing of fat wether lambs at lighter weights but for more per pound before shearing. **There is a risk of being badly caught in an unfavourable season with too much stock on hand.** Consequently the chance of making a little more income has to be carefully weighed against the possibility of a loss.

After lambs have been shorn they should be given the pick of pastures ahead of the ewes and all other stock. If pastures are still sappy and clovery, as they often are in the pumice country, avoid these if possible, concentrating lambs on fresh, mature, grass-dominant swards until the clover has hardened up considerably after hot, dry weather. At this stage both lambs and ewes should again be mob stocked and every attempt should be made to spell each paddock for three weeks or longer in an effort to do something at least to reduce the incidence of internal parasites, foot rot, etc. Once again the importance of having sufficient paddocks is apparent.

Not all ewe lambs will be required for flock replacement or to enlarge the existing flock. There are always the few that must be culled for such reasons as:

(a) Too small ever to make useful ewes.

(b) Undershot jaws or like serious defects.

(c) General condition too poor from whatever cause.

(d) Fleece defects as revealed at shearing time, etc.

Contrary to fairly general opinion it is not necessary that all twin ewe lambs should be culled. Provided their weight is satisfactory at weaning and they continue to thrive, there is no good reason for discriminating against them at this stage.

After all unwanted ewe and wether lambs have been sold the remainder should continue to be rotated around the best paddocks available ahead of all other stock. Maintain a careful watch on the live-weight gains of lambs and take all necessary steps to see that they do not slip back in condition, for it is often very hard to restore such condition once it is lost.

January and February are normally the hot, dry part of the year and lambs generally do reasonably well, but with the approach of the March-April period autumn rains with consequent flush of fresh, young growth can usually be expected. After this change in weather considerable lamb trouble can be caused by complaints such as facial eczema, parasitic infection, and general unthrift, and precautions must be taken well beforehand to offset such possible disorders.

Useful precautions that could be taken would include:

(a) Shutting up, say, 40 to 50 acres in early January, first well prepared by cattle, to provide mature grass for lambs if needed in autumn. This total area should preferably be in two or three paddocks at least. If growth threatens to get out of control through an abnormally good summer, control must be through judicious use of cattle. Used as carefully as possible this saved and safe mature feed should last four to eight weeks or more and see the lambs over the most critical period.

(b) Growing a sufficient area of medium-stem chou moellier to carry on with after the saved mature grass is finished (April onward). This can often be sown as a second crop to swedes provided ample fertiliser is used and the ground is not too weedy. If not required by hoggets, chou moellier may be used later to assist in wintering other stock.

Associated with these troubles and precautions the important practice of drenching to control internal parasites must also be considered. At the first sign of any trouble either consult a veterinarian or, if you know what to do, do not waste time in dealing with the problem. Quick action is necessary to avoid severe losses.

Hogget culling is best done just before dry shearing, say, late October to early November. This should be considered chiefly on the basis of wool and face cover. Obvious runts that have developed since lamb culling should also be culled at this stage, as they will never make good sheep.

In a well reared flock of hoggets the largest will not be the more fertile nor the smallest the least. Culling for size must therefore be on the basis of wool production and not fertility. Fertility within a well reared hogget flock is more influenced by the degree of face wool; the open-face hogget has been proved by Ruakura to be more fertile than one which is more or less wool blind. Culling for fertility should, therefore, be based more on face cover than size, always provided the hoggets have been well reared.

The above suggestions outline the main points in a programme of set-stocking ewes over the lamb period, that is, from three to four weeks before lambing up until weaning. On all other occasions it will be noted that the ewes are mob grazed to facilitate:

(a) Ease of general management.

(b) Cleaning up pastures and weeds.

(c) Preventing ewes from becoming too fat.

(d) Allowing paddocks to be shut

(Continued at foot of page 216)

Grading Points for Export Butter and Cheese

Contributed by the Dairy Division

BUTTER-MANUFACTURING companies which obtained an average grade of 93.75 points or more and cheese-manufacturing companies which obtained an average grade of 92.50 points or more during the year ended 31 July 1959 are listed below in order of merit. Of the total listed, 32 butter factories and 14 cheese factories are in the North Island and the remaining two butter and three cheese factories are in the South Island.

Creamery Butter

Factory	Registered number	Brand	Production	Graded for export	Average grade	Grading port
			tons	tons	points	
Cheltenham	3	Pakeha	1,601	811	94.423	Wellington
United	1,296	Whariti	567	146	94.297	Wellington
Konini	1,203	Konini	2,796	1,955	94.277	Wellington
N.Z. Dairy (Paerata)	109	Anchor	2,955	2,719	94.253	Auckland
Kuku-Manakau	905	Ohau	574	446	94.239	Wellington
Mangorei	345	Mangorei	1,255	1,032	94.237	New Plymouth
Cambridge	1,239	Cambridge	4,127	2,125	94.189	Auckland
Maungatapere	1,710	Moana	2,315	2,281	94.095	Auckland
Stratford	68	Stratford	2,409	2,050	94.066	New Plymouth
Levin	910	Lake	1,893	649	94.061	Wellington
N.Z. Dairy (Ngatea)	291	Anchor	3,906	3,832	94.006	Auckland
Rangitaiki Plains	133	Rangitaiki Plains	7,604	7,047	93.993	Auckland
Awahuri	664	Red Rose	1,373	515	93.992	Wellington
N.Z. Dairy (Waitoa)	91	Anchor	6,797	6,585	93.946	Auckland
N.Z. Dairy (Morrinsville)	330	Lockerbie	6,206	6,014	93.939	Auckland
Raetihi	717	Raetihi	216	93	93.938	Wellington
N.Z. Dairy (Morrinsville)	415	Anchor	3,790	3,778	93.935	Auckland
N.Z. Dairy (Mount Eden)	378	Anchor	3,226	88	93.894	Auckland
Kaikoura	302	Kai	596	70	93.891	Lyttelton
Taihape	1,188	Tikapu	133	10	93.882	Wellington
Te Aroha-Thames Valley	344	Overseas	4,535	3,981	93.865	Auckland
Midhirst	110	Rugby	2,230	2,046	93.865	New Plymouth
N.Z. Dairy (Tuakau)	1,320	Anchor	5,168	4,336	93.832	Auckland
Northern Wairoa	1,358	Northern Wairoa	4,991	4,812	93.826	Auckland
Westland	145	Westland	767	81	93.825	Lyttelton
Cape Egmont	632	Cape Egmont	1,831	1,828	93.822	New Plymouth
Te Awamutu	1,880	Anchor	10,121	9,990	93.813	Auckland
Wangaehu	1,326	Wangaehu	632	444	93.806	Wellington
Okoia	413	Okoia	673	470	93.801	Wellington
Bay of Plenty	1,399	Bay of Plenty	4,666	4,524	93.787	Auckland
Rangitikei	1,360	Rangitikei	1,120	745	93.783	Wellington
Hinuera	329	Hinuera	1,530	1,520	93.781	Auckland
Tauranga	1,478	Tauranga	3,203	2,696	93.765	Auckland
Shannon	1,489	Shannon	2,005	1,407	93.763	Wellington

Other butter companies whose butter was graded mainly for the local market and for which an average grade of 93.75 points or more was obtained for the combined local and export gradings were as follows:

Factory	Registered number	Brand	Production	Graded for export	Average grade	Grading port
Kaikoura	302	Kai	597	412	94.363	Lyttelton
Murchison	1,888	Airship	496	361	94.315	Lyttelton
Karamea	1,570	Karamea	436	333	94.227	Lyttelton
Inter-Wanganui	6	Inter-Wanganui	433	254	94.204	Lyttelton
Golden Bay	146	Sovereign	979	880	94.059	Lyttelton
Westland	145	Westland	769	539	94.033	Lyttelton
Blenheim	1,500	Opawa	326	24	93.770	Lyttelton

Cheese

Factory	Registered number	Brand	Production	Graded for export	Average grade	Grading port
Alton	1,890	Alton	885	885	93.109	Patea
Oxford	15	Oxford	615	593	93.085	New Plymouth
N.Z. Dairy (Waihi)	144	Anchor	1,194	1,194	92.904	Auckland
Woodlands	1,485	Woodlands	149	148	92.903	Bluff
Oaonui	491	Oaonui	2,033	706	92.701	New Plymouth
Westmere	1,621	Westmere	523	526	92.691	Wellington
Awatuna	60	Awatuna	2,390	1,168	92.688	New Plymouth
Lepperton	49	Lepperton	954	855	92.678	New Plymouth
Okains Bay	239	Okains Bay	215	162	92.673	Lyttelton
Eltham	1,039	Eltham	266	261	92.667	New Plymouth
Brooklands	1,619	Brooklands	513	493	92.647	New Plymouth
Massey	16	Massey	37	28	92.608	Wellington
Normanby	24	Steering Wheel	1,311	1,303	92.597	New Plymouth
Bell Block	71	Bell Block	984	329	92.592	New Plymouth
Awatuna	1,622	Awatuna	2,390	1,202	92.564	New Plymouth
Oteramika	813	Oteramika	144	159	92.515	Bluff
Kai-Iwi	1,565	Kai-Iwi	218	26	92.507	New Plymouth

Sheep in Rotorua-Taupo

(Continued from page 215)

up for specific purposes (for example, mature feed for lambs at time of eczema scares; feed to provide a higher plane of feeding for pregnant ewes five to six weeks before lambing; flushing feed for ewes and rams, etc.).

(e) Encourage the speedier development of higher-quality pastures.

(f) Reduce the incidence of parasitic problems.

(g) Promote better general animal health.

(h) Reduce mis-mothering of lambs to a minimum.

Though other systems of sheep management are practised throughout New Zealand, none offers better all-round possibilities for the pumice country farmer than the one described in these notes. Its advantages far outweigh any disadvantages and for this reason alone it is to be commended to the average settler striving to set himself up as a successful pioneer of the pumice.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during November 1959 and for the four months ended 30 November 1959 with comparative figures for the same month and for the four months of 1958 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
November 1959	23,540	406	23,946	—
November 1958	24,602	357	24,959	—
Decrease	—1,062	+49	—1,013	—4.058
Four months ended 30/11/59	76,683	1,274	77,957	—
Four months ended 30/11/58	81,801	1,108	82,909	—
Decrease	—5,118	+166	—4,952	—5.972

Butter in store at 30 November 1959 was 13,977 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
November 1959	12,443	611	13,054	—
November 1958	8,698	2,166	10,864	—
Increase	+3,745	—1,555	+2,190	+20.158
Four months ended 30/11/59	30,665	4,918	35,583	—
Four months ended 30/11/58	24,184	5,649	29,833	—
Increase	+6,481	—731	+5,750	+19.273

Cheese in store at 30 November 1959 was 10,116 tons

If these figures are converted into butterfat equivalent, there is a decrease of 2.451 per cent in butterfat graded for the four months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

TRACTOR ROLLING FOR PASTURE ESTABLISHMENT

THE lack of adequate consolidation is the greatest single factor causing poor or indifferent pasture establishment. An effective means of obtaining deep consolidation of the soil for new pasture is essential and is of special significance where the interval between deep working and sowing down is short. In this article important aspects of consolidation are discussed and a new technique is described in which the wheels of a tractor are used to heavy roll a paddock. The method is applicable to small paddocks only and is advanced primarily to meet the requirements of farmers who normally sow small areas in new grass. This method was suggested to several farmers in the Dannevirke district several years ago, who have since been using it with good results.

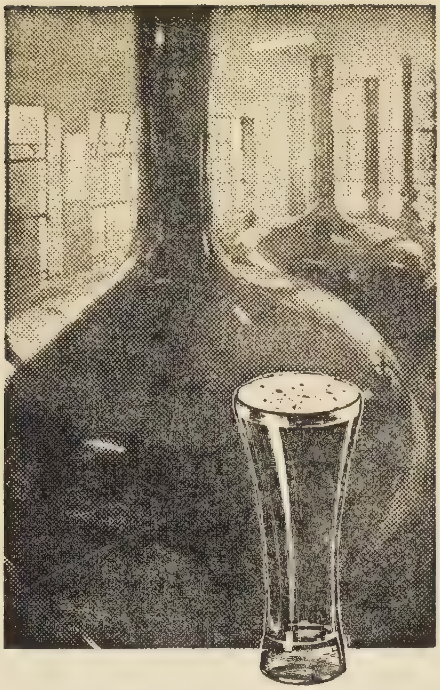
THE importance of good consolidation is demonstrated in many paddocks every season where the superior strike and establishment of pasture plants in the tractor wheel impressions can be plainly seen. The drier the conditions after sowing the greater the contrast, but in ideal weather for pasture establishment the difference can still be marked.

Why Good Consolidation is Necessary

The effects of consolidation can last well into the life of a pasture and can be an important factor in success or failure.

By L. W. BLACKMORE,
Farm Advisory Officer,
Department of Agriculture,
Dannevirke

Loose soil provides poor conditions for seed germination and growth, with the result that heavy losses of seedlings occur. Poor consolidation is not only a disadvantage under low soil moisture conditions but also where moisture is adequate or excessive. Seeds have a remarkable capacity to extract moisture from the soil under comparatively dry conditions, but they cannot



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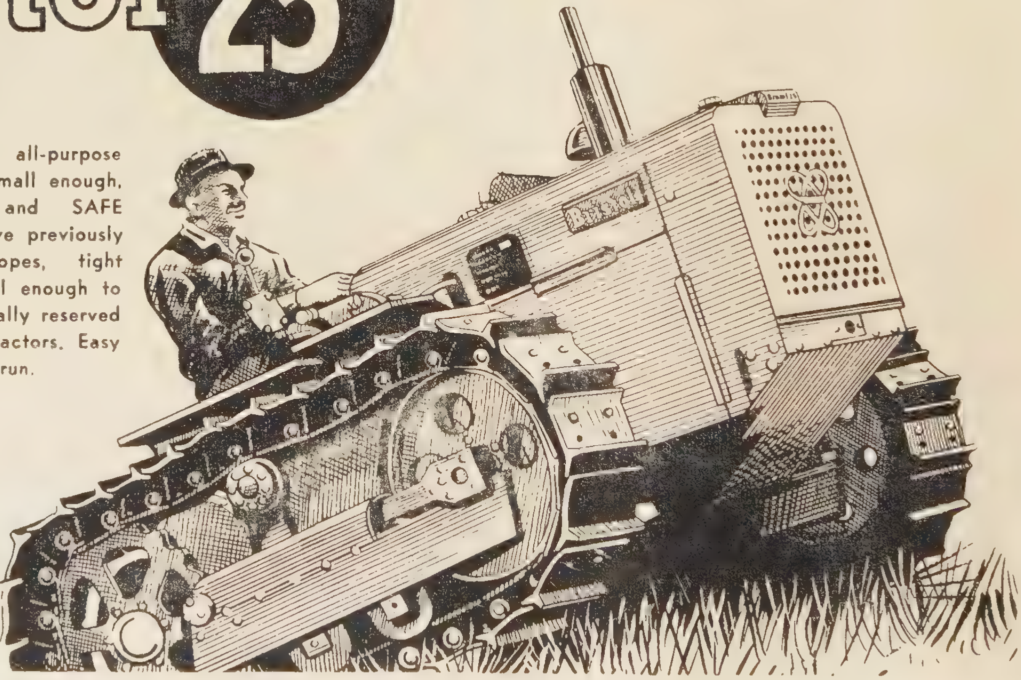


do this unless the soil round them is firm. Therefore, poor consolidation under limited soil moisture conditions can result in failure and good consolidation under the same conditions can bring success.

Often with late spring, early summer sowings increasing temperatures and winds dry out loose seedbeds in a remarkably short time. Drying takes place rapidly and progressively from the surface downward, and often involves much of the seedbed. Seeds that have already germinated may shrivel and die. The tragedy is that there are normally adequate reserves of moisture in the lower layers, but the topsoil cannot draw on these reserves to replace that lost by evaporation from the surface, because the link is broken by poor consolidation

Under these conditions death rates are high, particularly in ryegrass seedlings, not only because the seeds become dry, but also because they are subjected to excessive heat. Soil moisture is a protection for the germinating seed against excessive heat.

Too much moisture, however, will also restrict plant growth and so an unconsolidated rain-soaked soil will cause struggling plants to sicken and die. **A well consolidated seedbed will turn excess water away.**

Good consolidation not only improves the strike, but also encourages rapid plant establishment. Roots will not spread in loose conditions. That is why seedlings in poorly consolidated seedbeds have such small weak root systems. **Good consolidation is a direct stimulus to root growth.**

Tractor Corrugations

A corrugated surface in an established pasture is a sure indication that consolidation was uneven when the seedbed was prepared. Corrugations are readily apparent when travelling across a paddock in a vehicle, because the resulting vibrations necessitate a quick reduction in speed.

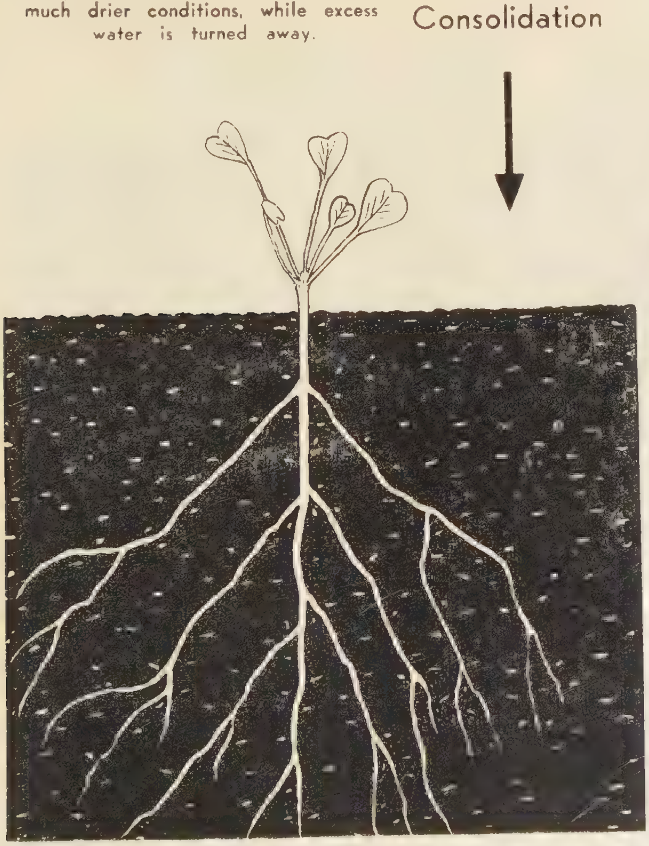
Tractor corrugations are caused in the following way:

The paddock after being ploughed and deep worked is left to fallow. It is then harrowed round and round in preparation for sowing. During harrowing the rear tractor wheels sink deeply into the soft soil and the soil under them is compressed. The attached harrows fill in the wheel marks with fresh soil up to the level of the rest of the paddock. The wheel marks therefore carry an extra quota of soil.

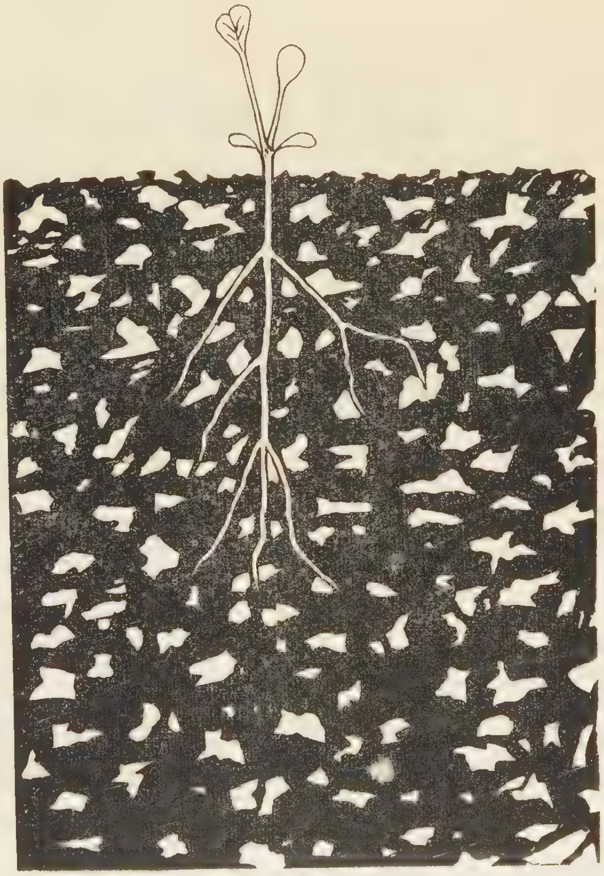
If the paddock is then Cambridge rolled, the weight of this rigid implement will be borne largely on the crests or "rails" created by the previously filled-in tractor wheel marks. As a result the soil in between remains loose and relatively unconsolidated. This unconsolidated soil ultimately settles down under the hoof action of grazing animals to form depressions between the crests.

A second or third Cambridge rolling does not improve the situation because the original tractor-created

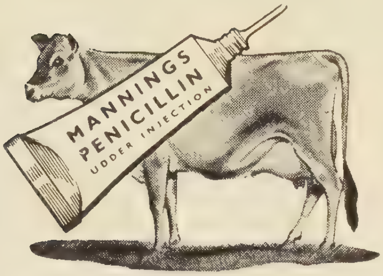
▼ Clover seedling growing in a well consolidated seedbed. Note the relatively small amount of air space present (marked in diagram in white). Good consolidation enables both seeds and plants to obtain adequate supplies of moisture under much drier conditions, while excess water is turned away.



▼ Plant growing in a poorly consolidated seedbed. Note the excessive amount of air space and the restricted root development.



MANNINGS



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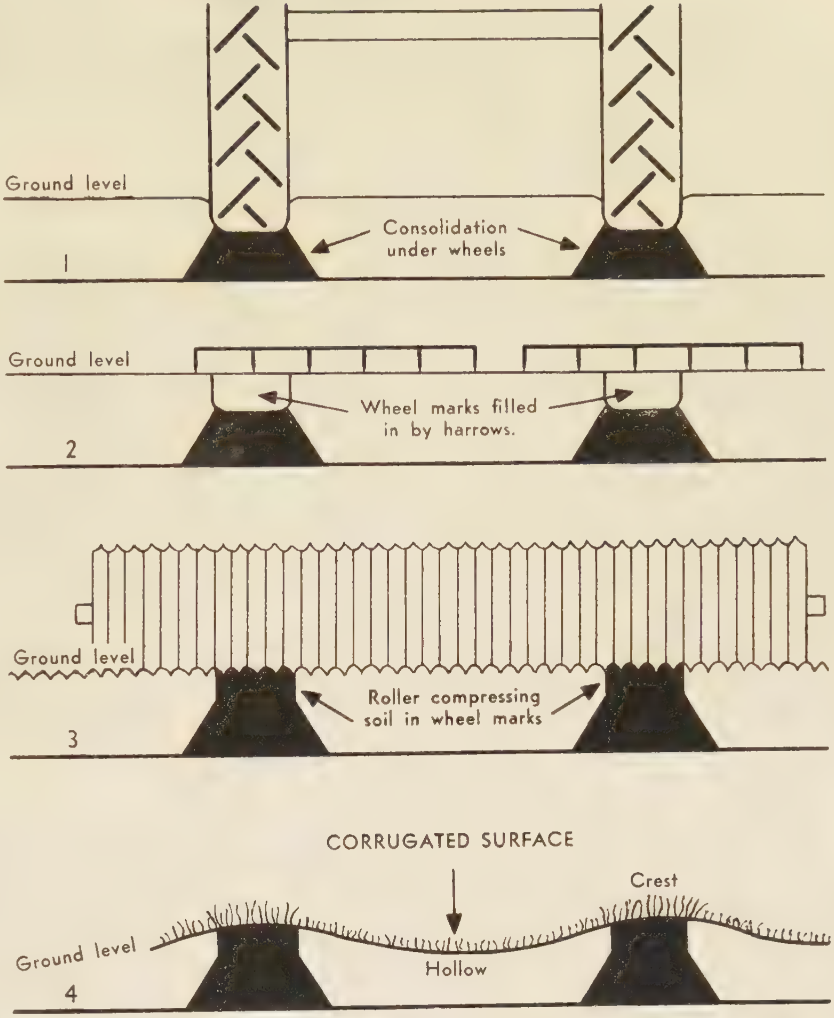
The diagram at right explains how tractor corrugations originate in established pastures.

1. The rear wheels of the tractor sink deeply into the soft cultivated soil and the soil under them is compressed. The compressed soil is shown in black.
2. The harrows attached to the tractor fill in the wheel marks with fresh soil up to the level of the rest of the paddock. The wheel marks therefore carry an extra quota of soil.
3. If the paddock is then Cambridge rolled, the weight of this implement will be borne largely on the crests or "rails" created on the previously filled-in tractor wheel marks. As a result the soil in between will remain loose and relatively unconsolidated.
4. The unconsolidated soil in between the "rails" ultimately settles down under the hoof action of the grazing animal to form depressions between the crests. The pasture grows much more rapidly on the consolidated crests.

TRACTOR-CREATED CORRUGATIONS


Ground level
Consolidation under wheels
1
Ground level
Wheel marks filled in by harrows.
2
Ground level
Roller compressing soil in wheel marks
3
CORRUGATED SURFACE
Crest
Ground level
Hollow
4

"rails" take the weight of the roller on each occasion. Whether the tractor wheels run on or in between the "rails" at this stage makes little difference in the long run. However, where they run in between the rails they will depress the soil below the operating level of the Cambridge roller.

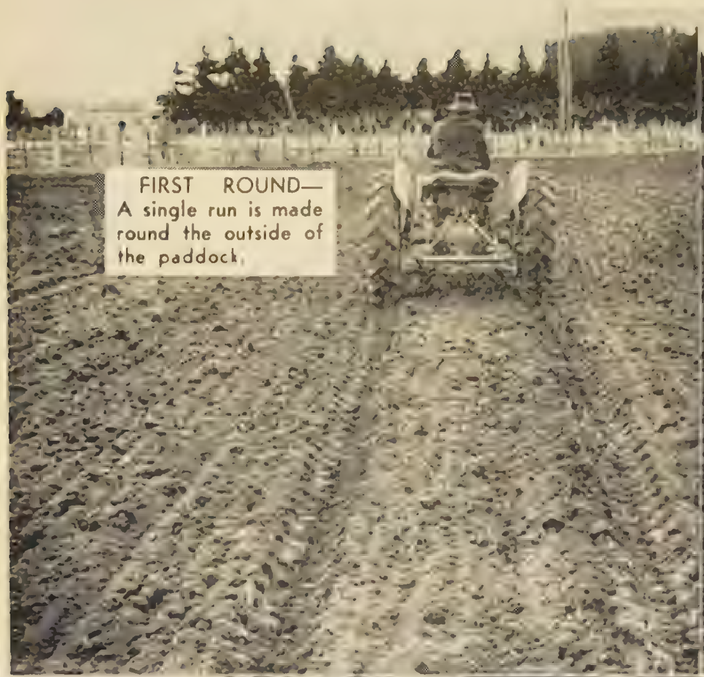
If instead of a single harrowing after the initial deep working two harrowings had been given, a different and somewhat irregular pattern would have resulted. The irregularity would have been due to the changing positions of the tractor wheels in relation to those of the first round. The only way to improve the position would be to harrow the paddock a number of times.

Where an unconsolidated paddock is harrowed one way and then cross harrowed, a chequerboard pattern of consolidation is created.

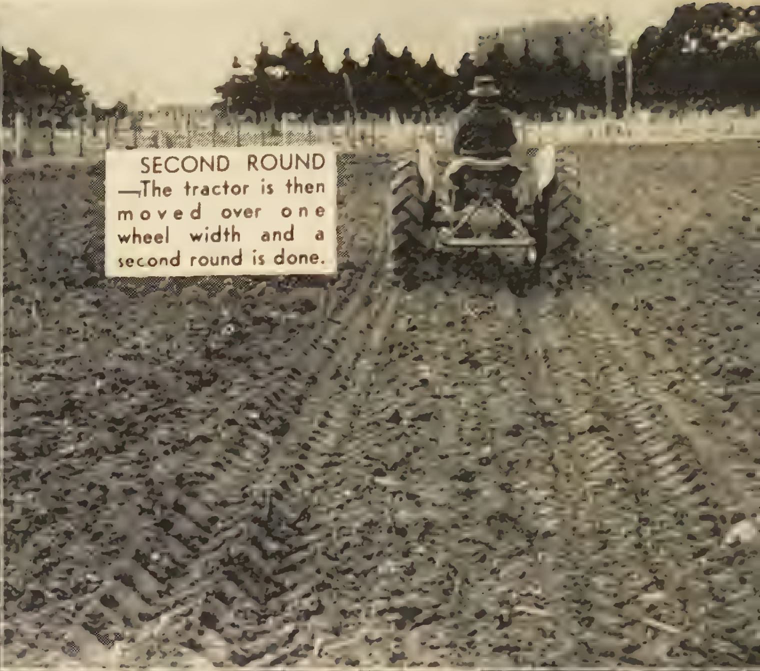
These instances show the dominating influence of the tractor itself in determining the consolidation pattern of the seedbed, and it is only when the tractor has been run over the paddock a sufficient number of times for its wheels to have covered most of the ground that overall deep and even consolidation is achieved.

← The dominating influence of the tractor wheels in effecting good consolidation is clearly demonstrated on this Cambridge-rolled surface. The rolling pressure of the wheels of a 30 cwt tractor is equivalent to about 1,300 lb per lateral foot, while that of a Cambridge roller is between 150 and 200 lb per lateral foot.

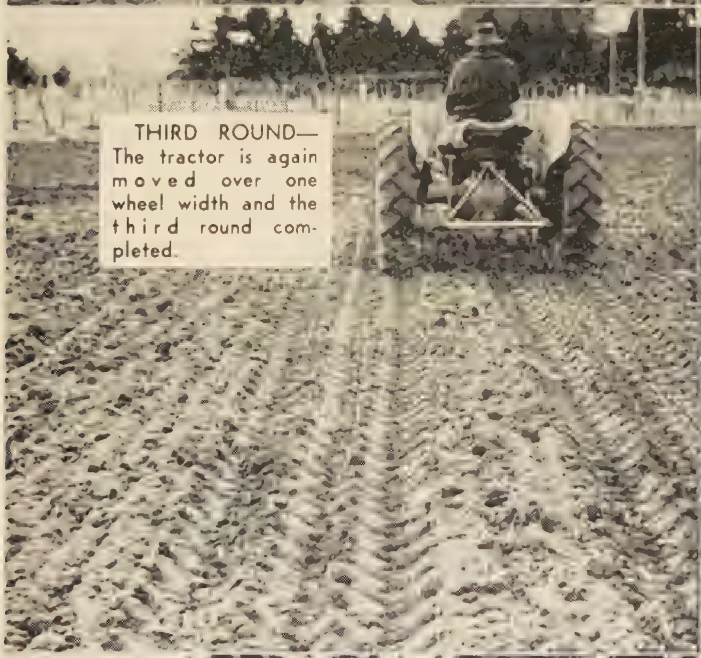
TRACTOR ROLLING



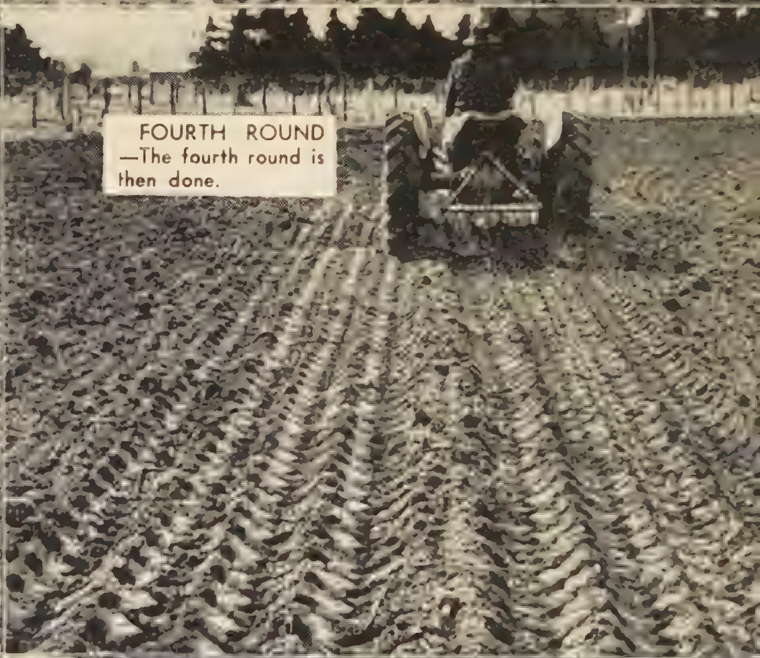
FIRST ROUND—A single run is made round the outside of the paddock.



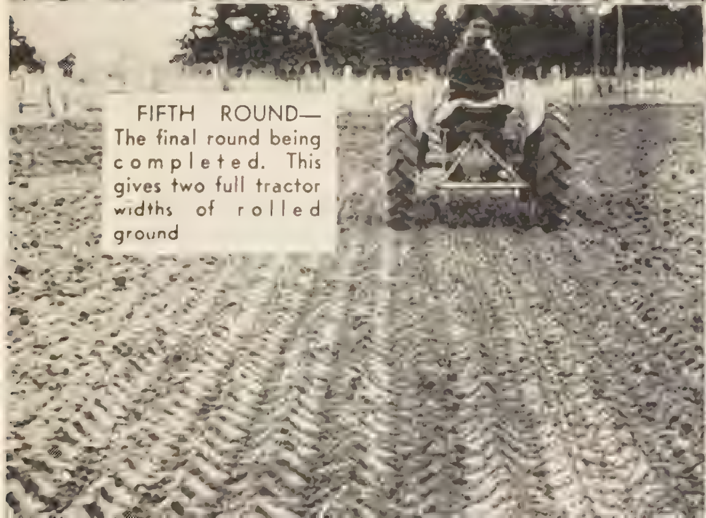
SECOND ROUND—The tractor is then moved over one wheel width and a second round is done.



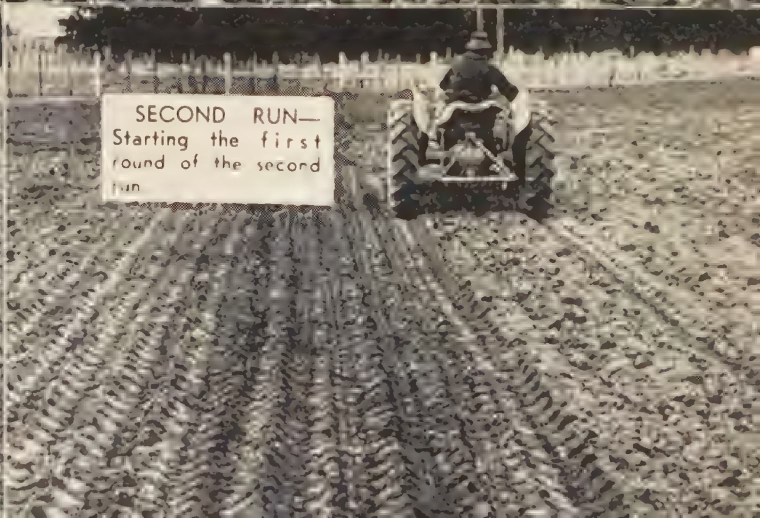
THIRD ROUND—The tractor is again moved over one wheel width and the third round completed.



FOURTH ROUND—The fourth round is then done.

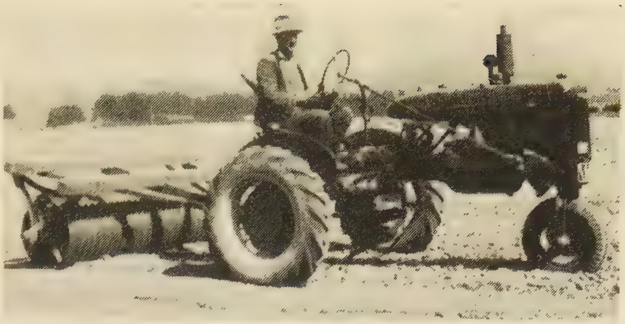


FIFTH ROUND—The final round being completed. This gives two full tractor widths of rolled ground



SECOND RUN—Starting the first round of the second run

METHODS OF CONSOLIDATING



CAMBRIDGE ROLLER: The Cambridge roller → gives excellent surface consolidation, but because of its comparatively low weight (150 to 200 lb per lateral foot) it cannot be relied on to consolidate a loose, open seedbed effectively. Note that though the tractor is very light, the near rear wheel is sinking well into the Cambridge-rolled surface.

HARROWS: Excellent consolidation can be obtained by repeated harrowing. However, the tractor itself is the dominating influence in achieving this consolidation.

HEAVY ROLLER: Deep consolidation can be obtained with heavy rollers. They are especially valuable on stony soils. Difficulty is experienced on corners unless the roller is split into two or preferably more sections. Smooth-surfaced rollers are inclined to leave an overfine surface.

TRACTOR: The weight exerted by the rear wheels of a 30 cwt tractor (per lateral foot) is about equal to that of a water-filled heavy roller of just over 5 ft diameter. On flat ground 1 acre can be tractor rolled in about $\frac{3}{4}$ hour. In contrast to a smooth-surfaced roller the cleats impart a "live" action to the tyre surfaces similar to the hoof action of stock. This ramming action ensures good deep consolidation and under dry conditions can result in very effective clod crushing.

TRACTOR ROLLING

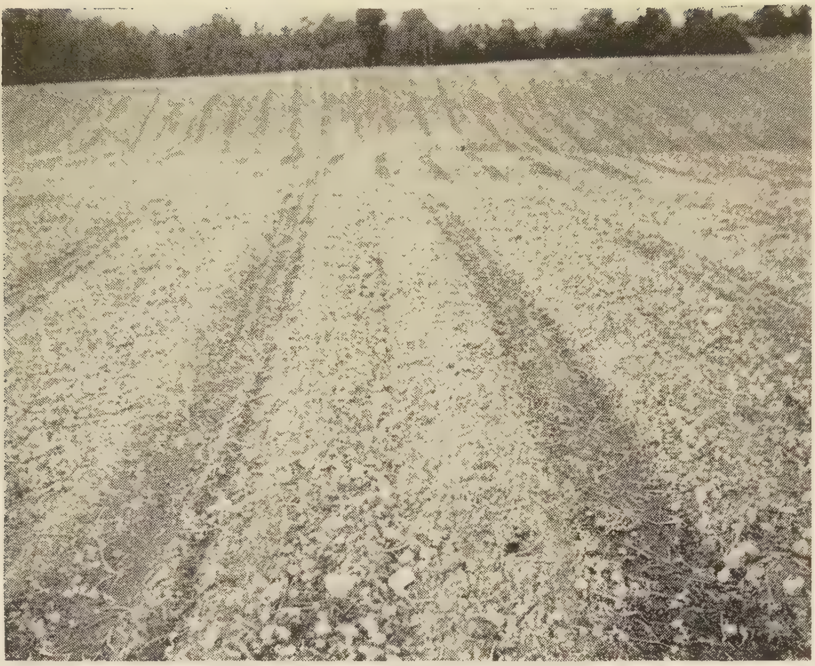
Technique

A technique of tractor rolling has been worked out in which the entire paddock is covered by the tractor wheels. The tractor is run round and round the paddock and positioned for each run so that the rear wheels run on fresh ground all the time. Based on a centre to centre rear wheel width of 4 ft 8 in. and 11 in.-wide tyres, a complete fill-in of two tractor widths is accomplished in five rounds of the paddock and results in a tractor-rolled surface just over 9 ft wide. The procedure then is to take the tractor out on to fresh ground and keep repeating the process until the entire paddock has been covered. Under dry cloddy conditions on stiff soils a Cambridge roller may be attached to the tractor throughout the operation.

Time Involved

Theoretically it would take half an hour at 9 m.p.h. to tractor-roll an acre of ground in this way. Actual times in the field have varied from 35 minutes (10 m.p.h.) to one hour per acre. Under good going on the flat, where a speed of 8 to 10 m.p.h. can be maintained using the wheel brakes on the corners, an acre should be done comfortably in three-quarters of an hour. Sharp corners would necessitate throttling down with some loss of time. It is better to cut the corners slightly and roll these out at the finish.

An average rate for heavy rolling with concrete or water-filled rollers of 3 to 6 tons weight and about 6 ft wide is about an acre in half an hour. The time taken for tractor rolling therefore compares quite well with that for conventional heavy rolling. This is accounted for by the greater operational speed and the minimum time loss on corners.



Moisture rising to the surface in the tractor wheel impressions, where the consolidation is good. Given such moisture, seeds will strike satisfactorily in dry weather. On the other hand where consolidation is poor moisture simply cannot rise to the surface no matter how plentiful it is below.

Advantages

1. There is no outlay on additional equipment or any problems of traction or manoeuvrability.

Though a much greater distance is travelled than with a conventional heavy roller, less fuel may be used because the tractor is operated at a greater speed and is not under any load.

2. Excellent consolidation is achieved.

The weight carried by the rear wheels of a 30 cwt tractor is about 10 cwt per wheel. If the weight of the man is included, the total weight per wheel is about 1,200 lb. The tyres for a tractor of this size would be 11 in. wide so that the actual rolling pressure per lateral foot would be about 1,300 lb. A 6 ft-wide water-filled cylinder roller would need to have a diameter of 5 ft 2½ in. to exert the same rolling pressure of 1,300 lb per lateral foot. If additional weight is required, tractors having a tray attachment can be weighted. A considerably greater weight is exerted on the rear wheels than that which goes into the tray because of the weight taken off the front wheels.

Another feature of tractor rolling is the part played by the tyre cleats. These represent only from one-quarter to one-third of the surface area of the tyre and because they initially take the weight of the tractor, they are forced well down into the soil with a strong ramming action. This action, combined with a certain amount of cleat movement, imparts "life" to the tyre surface. Though some movement due to wheel slip does occur this is normally very slight when the tractor is under no load. With a smooth-surfaced roller the effectiveness of rolling is reduced with an increase in speed because the weight of the roller remains on the surface for a shorter time. However with tractor wheel consolidation the higher operating speed tends to be compensated for by the increased ramming action of the cleats.

With tractor rolling the tyres, being comparatively narrow by normal roller standards, allow the full weight of the wheels to pass over every foot of ground. The downward thrust is therefore practically constant and so the wheels are very effective in finding the weak spots in the paddock.

There is a tendency for the weight of the wider, conventional roller to be borne on the high spots and for the depressions to receive less weight. This is known as bridging and is a characteristic of wide rollers. However, this comparison is not meant to be disparaging to heavy rollers, which have the advantages of producing a more even surface, and on land with large stones or boulders they will roll these in much more effectively.

3. A good surface is left.

Smooth-surfaced heavy rollers tend to leave a powdered surface, and on light, fluffy soils before the surface-compacted soil has had time to draw up soil moisture from below there is a temporary danger of losing some topsoil in areas exposed to wind. However it must be stressed that once the moisture has been drawn into the surface layer from below the chances of soil being lost in this way are greatly reduced; but surface caking after heavy rain is always a danger on clayey soils.

With tractor rolling most of the consolidating effect is of a deep rather than a surface nature. The soil immediately beneath the cleats is pushed well down while that in between the cleats, though subjected to pressure and movement, does not meet with the full impact of the wheel. The surface soil therefore tends to be more rubbly.

4. Rolling can be done on steeper inclines than with conventional heavy rollers.

Heavy rolling obviously is restricted to flat or nearly flat paddocks. Tractor rolling on the other hand can be done effectively on steeper inclines. Its limits will be determined more by wheel slip than the ability of the tractor to cope with the grade.

5. Effective consolidation can be achieved under drier conditions.

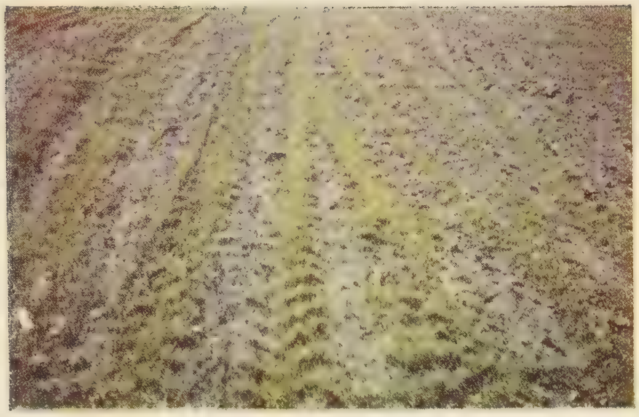
In conditions of limited soil moisture, which commonly occur in late summer-early autumn, paddocks can be effectively prepared for new pasture long before it would otherwise be possible.

On stiff clay soils that are loose, dry, and cloddy, conventional methods of cultivation are not very effective because the implements cannot get to grips with the soil and the clods and turf take the line of least resistance and are pushed to one side. Under such conditions, however, both clods and turf can be very effectively crushed by tractor rolling.

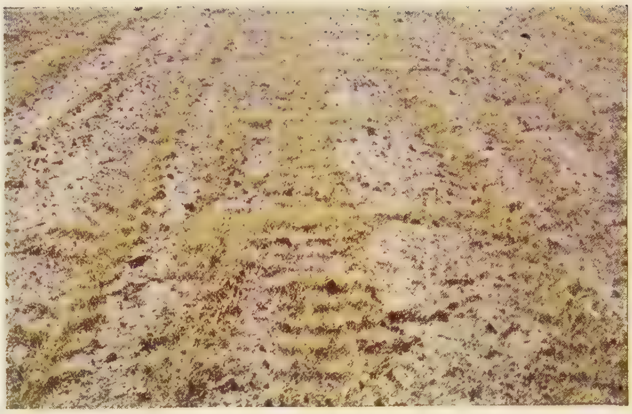
In dry conditions light, fluffy soils tend to become mobile under tractor wheel pressure with the result that a good deal of soil is displaced laterally as the tyres move over the surface. While surface soil movement is inevitable under these conditions, a good deal of effective deep consolidation can be achieved. On these soils a Cambridge roller behind the tractor would assist and could be used, provided this did not increase the risk of soil blowing or surface caking. However, such soils are more effectively consolidated when not too dry.

6. There is a saving in seed, and establishment is quicker.

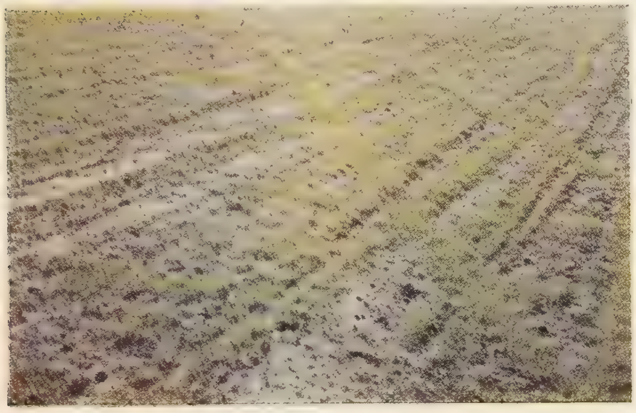
Both the germination and establishment of seeds are often strikingly better in the tractor wheel impressions. This is often obvious even to the casual observer. While the contrast is usually



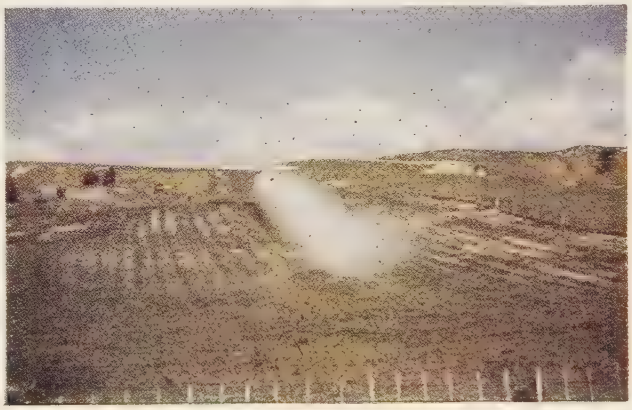
A pattern of tractor wheel impressions. Note the very much thicker strike and more advanced establishment in the wheel impressions. This was a wet autumn (1959) when over 10 in. of rain fell the month after sowing. Six months after this photo was taken the wheel impressions still stood out plainly because of their greater plant density and lighter colour associated with rapid plant growth.



The tractor wheel impressions running from the front to the rear of this photo were made during seed sowing. Those running from side to side were made during final seedbed preparation. Cleat pattern on these later impressions was eliminated during subsequent harrowing. This example emphasises the consolidating influence of the tractor at all stages.



An excellent example of the fact that a high seeding rate will not "cover up" a poor seedbed. Where the tractor ran diagonally across the field at the finish of sowing a double seeding resulted. Though the strike was considerably thicker in the wheel impressions where the double sowing was made, there was little or no improvement in strike in the spaces between the wheel marks.



Crawler track impressions are also a common enough sight. Because the tracks are much wider in relation to tractor width than the tyres of a wheel tractor, between a quarter and a third of the entire paddock is covered by the tracks in a once-over operation. The weather was dry after the above spring sowing.

most striking under very dry conditions, it can be quite marked where moisture is ample.

In a paddock sown in pasture last autumn in which ample moisture was available throughout germination and establishment, germination counts taken showed that there were three times as many clover and grass seedlings in the tractor wheel marks as there were in the spaces in between. Furthermore the seedlings in the wheel marks were much more advanced than those in the spaces in between.

In this paddock the number of seedlings in the wheel marks was excessive, while the number in between was far too low. It is considered that under the prevailing conditions about two-thirds of the seed sown (45 lb per acre) would have been sufficient if the entire paddock had been tractor rolled. The cost of the seed mixture was £5 16s. 3d. per acre. Therefore the equivalent of £3 17s. 3d. in seed per acre did not strike in the area between the wheel impressions.

Because of the poor strike and slow establishment of the seedlings there was a greater survival of weeds between the wheel marks and these grew larger and occupied more space because they had less competition from the establishing pasture species.

This illustrates the wastage of seed that can occur on a loose unconsolidated seedbed even under conditions of abundant moisture. It also brings out an important principle. Sowing rates and consolidation cannot be separated.

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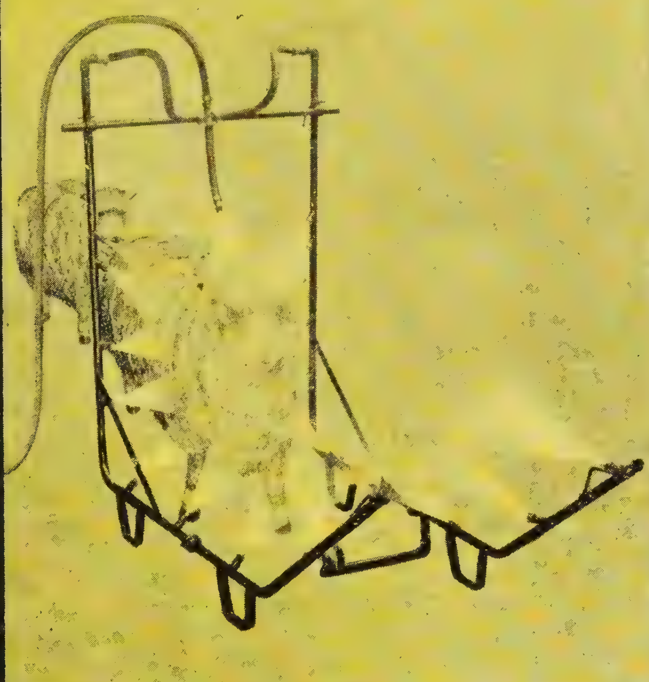

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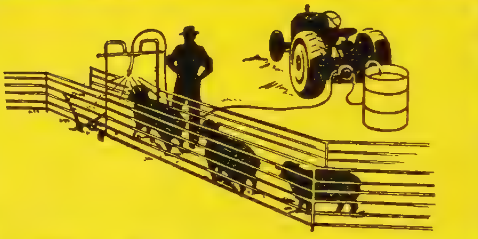

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There have been many instances where reduced sowing rates have given disappointing results because the significance of good consolidation was not appreciated.

Sowing the Seed

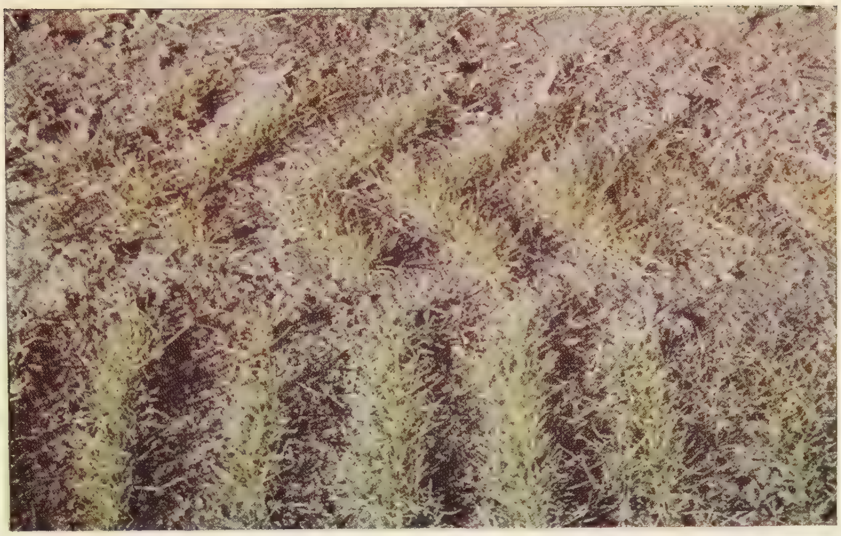
Seed should not be sown directly on to a tractor-rolled surface, as its distribution will be strongly influenced by the surface pattern. A quick harrowing should first be given to even out the surface and create a good top tilth. The seed should then be sown.

From this point on the procedure will vary with local conditions. It is suggested that the paddock should either be given a further harrowing to mix the seed well into the top layer and then a Cambridge rolling to press home the seed and complete the vital link between the surface soil and the tractor consolidated soil below or the area might be double Cambridge rolled.

A tractor-rolled paddock with a harrowed surface is ideal for either 3½ in. drilling or for v roller drilling provided, in the latter case, there is sufficient free soil on the surface to allow a full impression of the roller rings. Where a Cambridge roller is not available the seed should be sown on a harrowed surface after tractor rolling and sheep used to tramp the seed in.

Acknowledgments

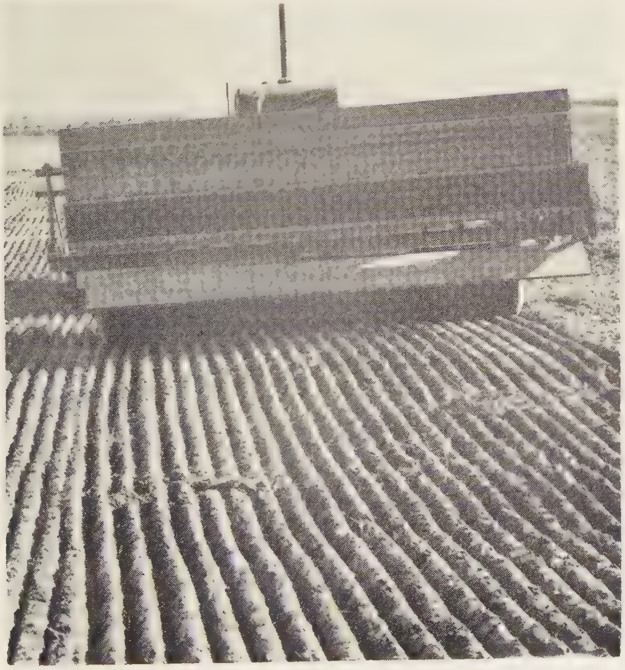
Thanks are due to Mr H. Anderson, Piri Piri, who assisted with the photographs of the stages in tractor rolling.



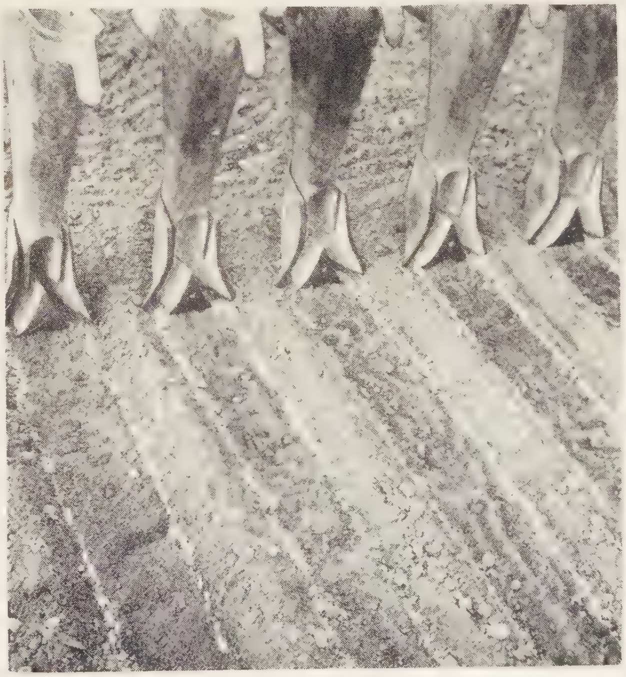
▲ The cleat patterns of both the wheel and crawler tractors stand out plainly. The seed falling into the cleat marks strikes better because consolidation is greatest there. It also receives more cover and is thus better protected against any adverse weather. As the distribution of seed is strongly influenced by surface pattern, a tractor-rolled paddock should be harrowed BEFORE sowing to break up the pattern.

Below (left): Surface impressions produced by a v-ringed roller-drill. This is putting into practice over the entire ground surface what was done by the wheels of the broadcaster. This is a precision method of sowing down pasture in which both the seed and fertiliser are sown in 3 in. rows at a uniform depth.

Below (right): 3½ in. drilling in which special attachments are fitted to grain drill coulters which divide the seed and fertiliser stream to produce two rows per coulter. Good consolidation is required and a tractor-rolled seedbed would be ideal. Precision methods of sowing lend themselves to reduced rates of seeding.



[P. D. Sears photo.



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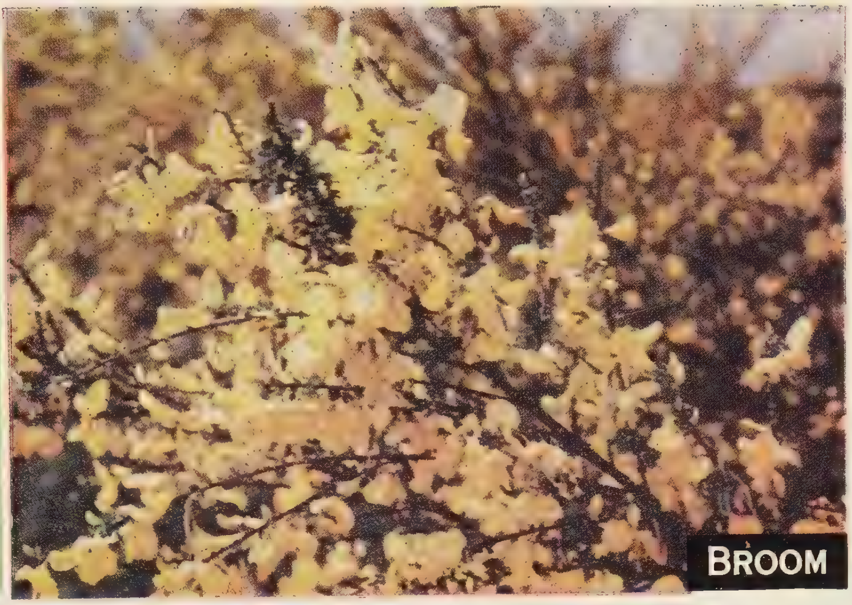
WEED IDENTIFICATION AND CONTROL

This is one of a series of articles illustrated in colour to appear in the "Journal" from time to time in which identification and control of various weeds will be discussed.



By L. J. MATTHEWS,
Principal Scientific Officer, Department of Agriculture, Wellington

BROOM species are largely weeds of waste areas and poor pastures. They do not compete with the high producing pastures, but are mainly weeds associated with land development and usually establish before sufficient fertility is built up to grow a productive pasture. The two main species are broom *(Cytisus monspessulanus)* and Scotch broom *(C. scoparius)*, both yellow-flowered plants. White broom *(C. multiflorus)* is less common. There are many ornamental varieties.

BROOMS belong to the same family *(Papilionaceae)* as gorse. They exhibit many of the characteristics of gorse: hard seed that lasts indefinitely in the soil and is dispersed by a dehiscing seed pod, flowers that have no nectar, etc. Gorse is entirely leafless, but the broom species mentioned above develop leaves which are divided into three small leaflets during spring and summer and which are shed during late autumn and early winter.

Both broom and Scotch broom are classified as noxious weeds under the First Schedule of the Noxious Weeds Act. Like many other plants the brooms were declared noxious before their potential hazards were realised. It is now known that the brooms will not compete with productive pastures; hence they need not be regarded as serious weeds.

Control in waste areas is of doubtful value; treatment is expensive and unless the broom is replaced by more suitable vegetation it will re-establish or undesirable plants such as gorse or blackberry will take over. In waste areas control is probably only worth while where isolated plants occur and these could be spread in heaps of road metal by graders, etc., and in this way become a threat to potentially valuable agricultural land. The spread of broom on the Rotorua-Taupo highway was due to its introduction in road metal and subsequent spread by graders.

Broom has no undesirable properties such as those of ragwort or other really poisonous species. Broom tops, both fresh and dry, are used in medicine as a slight stimulant for the kidneys. The green, angular, switch-like branches are quite flexible and have been used for basket work.

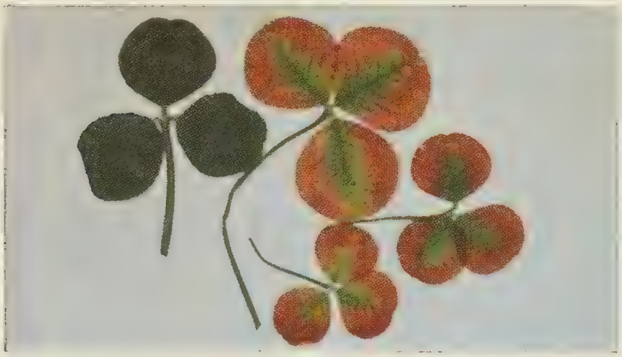
Control

The most permanent method of control relies on the inability of broom to compete with productive pastures. The initial development of land infested with broom species is best done mechanically. Broom species are most troublesome in the establishing stage of pastures, particularly if the fertility of the area needs to be raised before a productive pasture can be carried. This has occurred in the development of pumice areas in the vicinity of the Rotorua-Taupo highway. Weedkillers are the best means of getting temporary control until the productivity of the pasture is increased.

All broom species react in the same way to hormone weedkillers. In the seed-leaf stage plants are resistant. When 4 to 6 in. high they are quite susceptible to emulsifiable esters of 2,4-D at 1 lb of acid equivalent per acre. This is the stage at which they should be treated in young pasture, though clover damage may occur. Plants show susceptibility to 2,4-D emulsifiable esters at 2 to 3 lb of acid equivalent per acre until semi-mature, but once they begin to approach maturity better control is obtained with emulsifiable esters of 2,4,5-T at 2 to 3 lb of acid equivalent per acre.

Plants should be sprayed only when in full leaf, as results are poor if plants are sprayed when leaves are developing and when plants are in full flower before leaf development. The best results have been obtained when plants are in the seed head stage in late summer and early autumn. Plants in the leafless stage have been controlled satisfactorily by 2,4,5-T oil-soluble ester concentrates in diesel fuel oil instead of emulsifiable esters in water. Satisfactory control of broom that has been allowed to develop to maturity before control measures have been attempted has been obtained by aerial application of oil-soluble ester concentrates of 2,4,5-T in diesel fuel oil. Clover usually requires resowing or should be allowed to reseed after application.

Recent Research Work



MAGNESIUM DEFICIENCY IN WHITE CLOVER

THOUGH magnesium deficiency is common in glasshouse tomato crops in most districts, and is frequently seen in apple trees in Nelson orchards, definite examples in pasture plants are seldom found.

Magnesium has been included in a large number of Farm Advisory Division trials on pastures over many years, but little evidence of response has been obtained. The magnesium has usually been applied in the form of very finely ground magnesium carbonate (200 lb per acre) rather than Epsom salts (magnesium sulphate) to avoid the complication of possible sulphur responses. In the few apparent responses the effects were usually small or fleeting, or the soil was relatively acid (pH below 5.5), indicating that the responses were due to partial correction of excess acidity by the carbonate, just as in liming.

Clovers and grasses appear to need much less magnesium than plants such as tomatoes, potatoes, tobacco, and apples. Responses can be expected in the less sensitive clovers and grasses only when soil magnesium is very low. A conventionally described "low" level in soils is not a deficiency level as far as pasture growth is concerned.

A soil has now been found which is sufficiently low in magnesium (.06 milliequivalent per cent of exchangeable magnesium) to give clear-cut magnesium deficiency symptoms in white clover grown in 6 in. plastic pots and good responses to Epsom salts. The soil was obtained from Whakarewarewa nursery adjoining the Forest Research Institute, Rotorua. Tree seedlings had been raised in this area for about 50 years. Magnesium responses in pine seedlings had been obtained by G. M. Will on this soil.

The area from which the soil was taken for the pot trial had recently been treated with 1 ton of ground limestone per acre and small amounts of superphosphate and potassium fertiliser. Its pH value was 5.4, with some unreacted free lime present. As soil analysis levels indicated that it was still deficient in potassium and phosphorus, superphosphate was mixed into the soil at 10 cwt per acre and potassium chloride at 4 cwt per acre. Treatments used were nil, 4 cwt and 8 cwt of Epsom salts per acre, lime at 1 ton per acre, and 1 ton of lime plus 8 cwt of Epsom salts per acre. There were five pots of each treatment.

HEADING PHOTOGRAPH: Clover leaves affected by magnesium deficiency (right) compared with a healthy leaf (left).

The average yields and magnesium levels in cuts taken in March and July were as follows:

AVERAGE DRY MATTER YIELDS and MAGNESIUM CONCENTRATIONS

	Grammes dry matter per pot		Percentage of mg in dry matter	
	12/3/59	16/7/59	12/3/59	16/7/59
Control	2.45	2.96	0.11	0.04
4 cwt of Epsom salts ..	2.62	5.25	0.33	0.22
8 cwt of Epsom salts ..	2.72	5.42	0.40	0.34
1 ton of lime	2.97	5.68	0.13	0.04
1 ton of lime plus 8 cwt of Epsom salts	2.87	8.14	0.31	0.28

In April, after the first yield cut, magnesium deficiency symptoms appeared on some of the older leaves of plants in the pots without added magnesium. These showed as reddish bands around the edges of the older leaves. The plants were sprayed to control mites and later in April the affected leaves turned to a dark, reddish brown and died, possibly because of the spray treatment. Growth throughout has been slow. Symptoms again appeared early in June and were quite pronounced by the date of the second cut in July and in subsequent growth (see illustrations).

Yield and analytical figures for the second cut indicate that the lime response in this trial is not due to the correction of magnesium deficiency, as the magnesium levels in the plants from the limed and unlimed pots without added magnesium are the same. Both show extremely low magnesium levels and a similar incidence of deficiency symptoms. The lime and magnesium responses appear to be independent and additive.

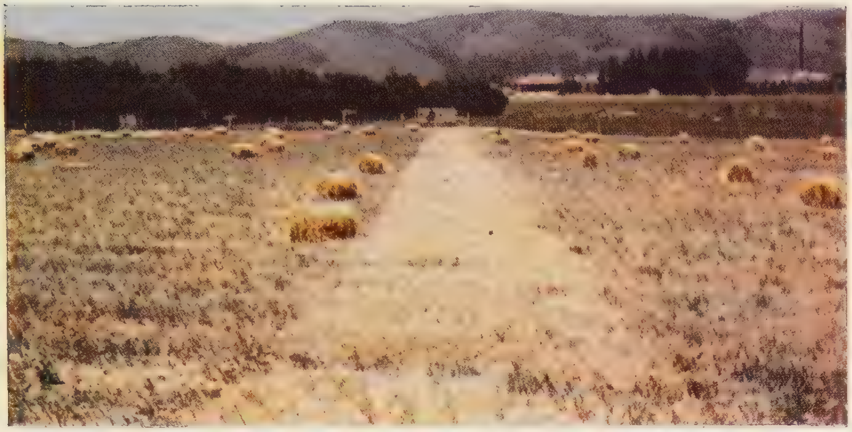
▲ Left — Control. Right — Plus lime at 1 ton per acre.

Plus lime at 1 ton and magnesium at 8 cwt per acre. →

A field trial has been laid down by the Farm Advisory Officer at Rotorua, C. R. Taylor, to see whether the responses to magnesium can be repeated with pasture in the field. A further pot trial is planned to determine the minimum soil and plant magnesium contents for healthy growth of white clover.

—*K. J. McNAUGHT, Principal Scientific Officer, and F. D. DOROFAEFF, Scientific Officer, Department of Agriculture Rukuhia Soil Research Station, Hamilton*

Weed Control in Lucerne



WEED control in lucerne must be studied from two main points of view; first in the newly sown crop and second in the mature stand. These two can be subdivided to cover problems such as: 1, the effect of cultivation and sowing practices on the weed population; 2, the control of grass weeds; 3, the control of broad-leaved weeds, and 4, the control of mixtures of the two. Some recently introduced herbicides have provided the answers to a few of these problems, and generally the picture is much brighter than it used to be owing to the efficiency of 2,4-DB in controlling weeds in seedling lucerne and of dalapon in controlling grasses in established lucerne.

By F. A. MEEKLAH,
Technician,
Department of Agriculture's
Invermay Research Station

CONTROL IN NEWLY SOWN STANDS

Cultivation

TO reduce the number of weeds in newly sown lucerne pre-sowing cultivation is important. Investigations on the effect of various cultivation practices at Rothamsted Experimental Station, Harpenden, England, have confirmed observations by research workers in other parts of the world that the mouldboard plough is a good weed control implement. This factor is important in countries where disc ploughing, chisel ploughing, and other surface-type methods of cultivation are fashionable, but is not so important here in New Zealand, where few farmers have dispensed with the mouldboard plough.

Another factor that affects seedbed preparation is that where the rootstocks of perennial weeds such as docks are present the cultivation programme should be planned to chop these rootstocks as much as possible into little pieces so that any regrowths from them in the subsequent lucerne crop will have only small reserves to draw on and so will be more susceptible to weedkillers.

Time of Sowing

There is little doubt that the problem of weeds in seedling lucerne has encouraged the practice of fallowing the land and delaying sowing until about February. Recently there seem to have been fewer successes in reducing weed infestation by this method; the reason for this could be that more intensive farming has raised the soil's fertility and also increased the weed seed population in the soil. It is not known to what extent the proportion of weed seeds in the soil can be reduced by this summer fallowing system, but even if the numbers were halved, there would still remain ample weed seeds to plague any establishing crop.

In practice, it generally seems that the type of weed population is changed from fathen and members of the *Polygonaceae* (for example, redshank) in spring sowings to chickweed and fumitory in late summer sowings. The last two weeds can be a serious problem in young lucerne struggling to establish in the first winter.

Effectiveness of 2,4-DB

The other point which should influence a change from the practice of February sowing is that at last we have a weedkiller which can deal satisfactorily with most weeds in seedling lucerne. This material is referred to by its chemical abbreviation 2,4-DB, and gives excellent control of such weeds as fathen, cornbind, redshank, wireweed, wild turnip, sow thistle, the seedlings of various species of thistles, seedling docks, and regrowths from short, chopped-up rootstocks of such established perennial weeds as docks and Californian thistles. It has no effect on seedling lucerne sprayed between 2 and 4 in. high.

← Control of browntop in lucerne. The two outside strips have been treated with dalapon at 4 lb per acre and the centre is untreated.

As we now have a spray which does a good job on the weeds and yet hardly affects the seedling lucerne, there can be little justification for sowing lucerne at any time other than late spring, which many authorities consider is the best time for the establishment of a lucerne crop.

Sowing in late spring has distinct economic advantages in that one and sometimes two cuts can be obtained, giving a yield of up to 60 bales per acre in the first season; against this must be set the cost of spraying, which would be about £2 per acre or less. An added benefit is a stronger stand going into winter with better establishment and more vigour, better able to resist future grass and flatweed invasion. Incidentally chickweed and fumitory are not as readily controlled with 2,4-DB as are the common weeds occurring in spring-sown crops.

Mixtures of Dalapon and 2,4-DB

How should one deal with the rare occasions when seedling grasses as well as broad-leaved weeds germinate with the crop? Recent work has shown that 2,4-DB and dalapon are perfectly compatible, and a mixture of no more than 1 to 2 lb of dalapon plus 1 lb of 2,4-DB should give adequate control of seedling grasses and other weeds, without any adverse effects on the lucerne.

CONTROL IN ESTABLISHED STANDS

Broad-leaved Weeds

Docks are becoming more frequent in lucerne stands, perhaps because of the present higher fertility. It is not

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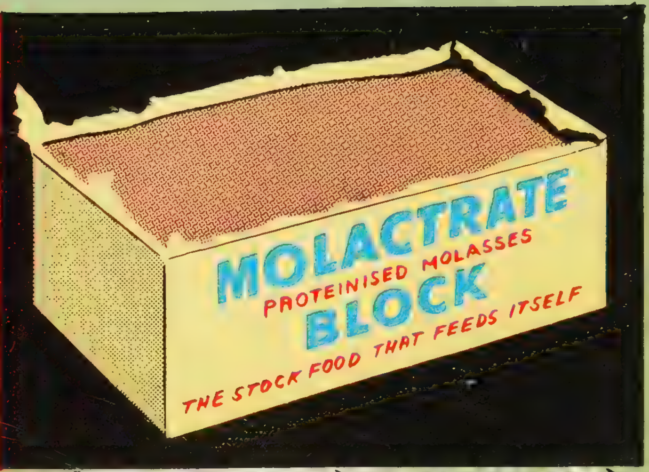
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clear whether docks establish in the seedling lucerne and later thrive on the system of intermittent cutting for hay or whether they invade the stand later. If they establish in the seedling lucerne, a spray of 2,4-DB at this stage should be satisfactory, but if they become established later in a stand, not much can be done about it, apart from spraying each dock plant individually, with a strong dose of 2,4-DB—rather a tedious job, and hardly economic.

It does not appear to be very satisfactory to apply 2,4-DB to established lucerne to control broad-leaved weeds. At present we do not know the reason for this, but hope that future work may give an answer.

Flat Weeds

Some established lucerne stands are invaded by weeds commonly referred to as flat weeds (shepherd's purse, daisies, dandelions, or cat's ear). Generally this is due to a reduction in vigour of the lucerne caused by factors such as a nutrient deficiency, incorrect management (for example, overgrazing, though this generally results in grass infestation), too frequent cutting, poor drainage, or any combination of these.

Weedkillers alone will not successfully control weeds caused by such factors. It is necessary first to correct the management, and this on its own may eliminate the weed problem by increasing lucerne vigour. In any case the management will have to be corrected in addition to the application of weedkillers if weed infestation is not to occur again. Also, there is the difficulty that the one non-toxic weedkiller for use in lucerne, 2,4-DB, has not been satisfactory on established lucerne in many instances, particularly in Canterbury. Thus the only direct action left is to cultivate the paddock lightly. At one time it was accepted that lucerne would withstand any amount of "knocking about" during the dormant season. Now there is a swing to the opposite belief, which may be a good thing, because there is no doubt that cultivation can damage the lucerne, yet may not kill a high enough proportion of the weeds owing to adverse weather conditions, and may also provide a seedbed for germination of grasses or more broad-leaved weeds.

Annual Grass Weeds

Most important is the control of grass weeds, which do not generally become a problem until the stand has been established two years or more.

If a fairly young stand becomes infested, it is most frequently with annual grasses such as *Poa annua* or barley grass. It is not very clear how important annual poa may be in affecting lucerne yields. Work at Invermay indicates that the type of season affects the competitive effect of annual poa considerably; a cool, wet spring encourages annual poa growth, and yields of lucerne at the first cut may be affected, but in a dry spring there appears to be little competition from annual poa and at the first cut no effect on yield can be detected. At present no advice can be given on whether it is economic to spray for control of annual poa, but it is certain that not more than 2 to 3 lb of dalapon is warranted to control it.

It is different with barley grass; almost regardless of economics it is important that every effort should be made to eliminate this weed from the farm. The barley grass problem appears to be getting worse each year, and all too often the feeding out of hay infested with barley grass is encouraging its spread. Recent work on the longevity of barley grass seeds suggests that they are viable only for just over one year. This important finding means that a killer policy around the farm aimed at preventing barley grass from seeding could in two years, or at the most three, eradicate this weed from the farm. From then on a policy of simple hygiene to prevent the introduction of fresh seed, with spot spraying of isolated outbreaks, should make the barley grass problem a minor one.

Barley grass is easily controlled with 2 to 3 lb of dalapon per acre at most growth stages: the lower rate of 2 lb should be quite adequate for control up to the late-tillering stages, but 3 lb (or more) should be used if flowering heads have started to appear.

It is doubtful whether there is any benefit in spraying barley grass once the seed heads are fully formed but are still green, as the plant seems to be able to carry on and produce a certain amount of viable seed. This weed should never be permitted to progress to seed head stage in lucerne; spraying should always be done in early spring.

Perennial Grass Weeds

The more difficult problems of grass control in lucerne stands arise when established perennial grass weeds must be removed. The most common weed in this situation is browntop, with a smaller proportion of other grasses such as Yorkshire fog and crested dogstail, and occasionally the better economic grasses such as perennial ryegrass, short-rotation ryegrass, and cocksfoot.

Browntop, with its prostrate creeping habit, is clearly the grass that does the most damage to lucerne stands, and considerable mortality can occur among the lucerne plants after possibly two years of competition against this weed. This factor of lucerne mortality is very important in that if there has been appreciable mortality, it is better to plough up the stand rather than try to renovate it with dalapon. There is no doubt that dalapon properly applied will control browntop satisfactorily, but if there is not sufficient lucerne left to provide an aedquate and vigorous ground cover, invasion by flat weeds is most likely to occur or speedy reinfestation with grasses will take place.

Time of Spraying

Time of application appears to be a major factor with dalapon in preventing infestation by flat weeds or a reinfestation of grass, though grass control with it seems relatively easy at almost any time of the year. Work in the South Island has shown that early spring, just after the lucerne has begun growth and is from 2 to 4 in. high, is the best time to spray. Some check in production is bound to occur at the first cut, but all subsequent cuts are equal to, or better than, normal.

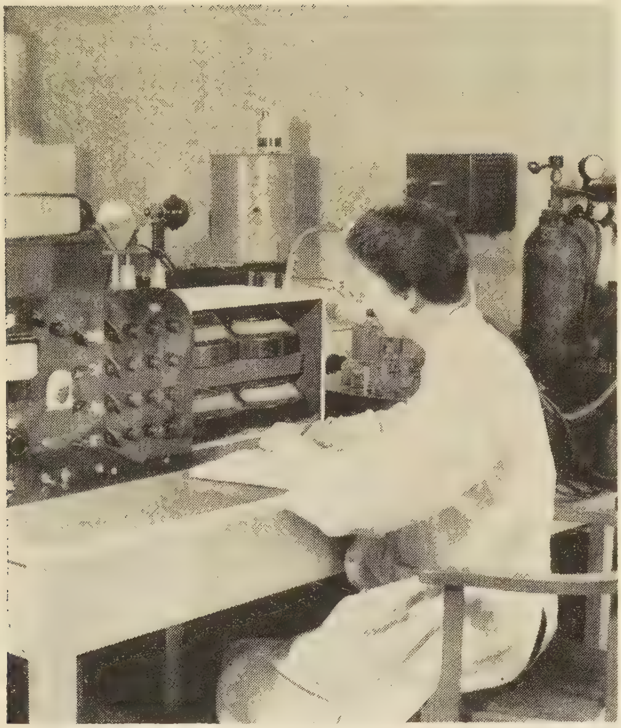
It would seem important to ensure that the ground cover is reduced for as short a period as possible. In one trial investigating times of spraying on an area where the major weed concentration was annual poa, not flat weeds, all plots sprayed during the dormant stages carried a substantial amount of annual poa by the end of the growing season. This annual poa infestation was reduced as the spray was applied closer to spring, until at the early spring treatments little, if any, annual poa remained. In other time-of-application trials similar cases of flat weed infestation of dormant treatments and of early spring treatments remaining relatively clean have been noted.

Dosage Rates

Properly applied and under good conditions 2 to 3 lb of dalapon per acre should be adequate for the control of annual grasses, while 4 to 5 lb is adequate for perennials like browntop. Results have been good from spray volumes of about 15 gallons per acre and a volume between 15 and 20 gallons per acre is recommended; less than 10 gallons would seem likely to cause variable results under the wide range of conditions on various farms.

Higher rates of dalapon are often required to knock out the better economic grasses such as short-rotation ryegrass, perennial ryegrass, and cocksfoot, but it seems doubtful whether it is economical to attempt to remove these with dalapon at its present price. These grasses have a fairly erect growing habit and a scattered infestation is not likely to cause any great deterioration of the lucerne; on the other hand they contribute materially to the yield, whereas the prostrate weed grasses do not.

In conclusion, emphasis must be laid on the manurial and managerial factors involved in the production of a crop such as lucerne. Unless these are correct and adequate, weedkillers cannot be expected to do a good job in removing the weeds initially, and the speedy reinfestation of weeds will not be prevented.



ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture Trials and Experiments

Rukuhia

Responses to Burnt Lime on Sulphur Deficient Soils

Some years ago W. R. Lobb reported responses to burnt lime and slaked lime, but not to ground limestone, in experiments at Oamaru on sulphur deficient soil. It was suggested by the fertiliser chemist K. F. Hoy that these effects could be explained by the sulphur contents. This has now been confirmed by analyses at Rukuhia Soil Research Station.

The coal used in preparing the burnt lime at Oamaru contained 3.9 per cent sulphur, and samples of burnt lime and slaked lime contained 0.7 to 0.8 per cent sulphur compared with 0.06 per cent in the original limestone. Analyses of clover leaf tissues from a plot which received ½ ton of burnt lime per acre showed a similar increase in sulphur levels to that obtained from application of 28 lb of sulphur per acre, and yield responses were similar.

Wallaceville

Copper Deficiency and Lamb Growth

Past research has indicated that, in general, provided copper deficiency does not cause paralysis in lambs, they tend to grow at normal rates. However, there may be special circumstances in which copper deficiency does exert some effect on lamb growth. This possibility is being investigated at Wallaceville Animal Research Station and on farms in selected areas where copper deficiency may be a problem.

Invermay

Depth of Ploughing

An investigation is in progress at Invermay Research Station to measure the effect of ploughing to different depths. Attention has been focused on the depth to which it is desirable to place the top inch or so of soil, in which fertility has been accumulated from previous topdressings and stock returns of dung and urine.

A high-producing hill country pasture was selected and plots were ploughed to depths of 4 in. and 8 in. Other plots were unploughed, but the existing sward was killed off with chemicals. All these plots were oversown at the same time with a normal pasture seed mixture.

In the first year only slight yield differences became evident. Last spring, however, the ploughed plots showed the typical winter yellowing associated with nitrogen deficiency commonly found on first- and second-year pastures on this country. The plots chemically treated carried a vigorous, healthy sward which outyielded ploughed plots by approximately 37 per cent. This trial will have to be carried on for several years, but present results indicate the importance of the top layer of fertile soil and the need to ensure that it is placed where a particular crop can make the most use of it.

At present a trial area is being prepared to investigate this aspect by use of a swede crop; if possible a rotation will be followed through.

Ruakura

Direct Utilisation of All Pasture Growth

The majority of dairy farmers must continue to follow a stocking and farming policy in which sufficient surplus feed can be accumulated during spring and autumn to meet the requirements of the herd during the months of poor pasture growth, but an alternative that can be practised by a few is to increase stocking to a level at which all pasture growth is consumed directly by stock and the extra needed during winter is bought. For farmers on small holdings this alternative system may pay better.

Some light on this matter may be obtained from an observational trial recently started at Ruakura Animal Research Station in which a small herd is being run at the rate of two cows per acre. The cows will be milked throughout spring and for as long as is possible in autumn. The amount of hay necessary for wintering will be recorded to work out the economics of the system.

Rukuhia

Peat Research at Moanatuatua

Important information for the development of peat areas has come from trials conducted by Rukuhia on the Department of Agriculture's 100-acre peat farm on the Moanatuatua swamp. Practically waste land four or five years ago, the farm carried 400 ewes in the 1958-59 season and 406 lambs were sold off the area.

A large number of trials are conducted to investigate the requirements for lime, phosphate, potash, nitrogen, and a number of minor elements. In other trials grass species, drainage, irrigation, soil cultivation, shelter, and rush control on peat are being investigated.

Trace element trials on newly developed fibrous deep peat were conducted recently to investigate the need for minor elements on peat adequately supplied with lime, phosphate, potash, and copper. Of the different minor elements applied, molybdenum gave the best response.

Clovers in particular benefited from this treatment; they grew more vigorously and had a healthier appearance than on untreated plots. This treatment not only increased the percentage of clovers in the pasture, but also the nitrogen in the clovers. The better clover growth and the consequent increase in the nitrogen status of the soil resulted in more vigorous ryegrass growth compared with the poor, spindly plants on the untreated areas.

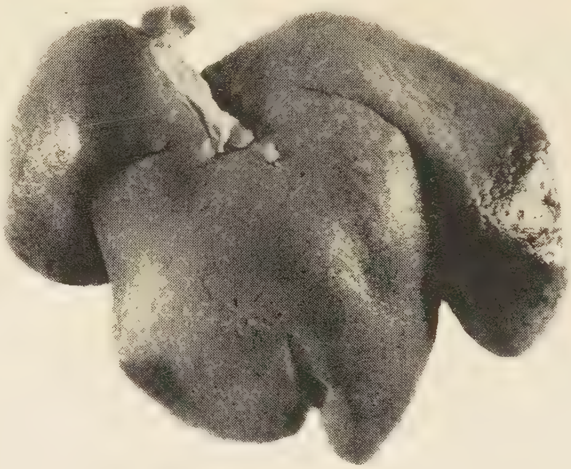
A point of particular importance was that production was more than doubled on the molybdenum plots during last winter.

These trials were conducted on peat where chemical analysis had previously shown that the pasture was extremely low in molybdenum (less than 0.1 part per million). So far such low levels of molybdenum have been found only on very raw peat of the high moor type. Some peat pastures contain several parts per million of molybdenum and the application of sodium molybdate to such pastures could result in a high molybdenum-copper ratio and consequent danger to the stock. Therefore sodium molybdate should on no account be applied to peat pastures unless recommended by local farm advisory officers. A survey of peat areas is being made in conjunction with farm advisory officers to define the molybdate deficient areas.

Wallaceville

Hepatosis dietetica in Pigs

Over the past year or so deaths in young pigs have been reported which on post mortem show a grossly abnormal liver (illustrated below). Similar livers have been recorded as due to pitch poisoning and also after the feeding of excess quantities of cod liver oil, which interferes with the vitamin E metabolism. This latter condition, which has been the subject of intensive investigation in Sweden, has been called *Hepatosis dietetica.*



A recent heavy mortality in young pigs was shown to be due to the feeding of excess quantities of a proprietary vitamin A and D_3 supplement and farmers are urged when using these products to ensure that they feed them as directed by the manufacturer. Do not adopt the policy that if the recommended quantity does them some good, double the quantity will be twice as good.

Wallaceville

Selenium

Recent trials on the pumice soils of the Rotorua-Wairakei area indicate that pre-tupping administration of selenium can substantially reduce the incidence of barren ewes on some problem properties. In addition, monthly dosing of pregnant ewes with selenium will prevent the development of congenital white muscle disease in the lambs.

Care of Livestock during April

By the Animal Research Division

CARE OF CALVES

THE best way to prevent calves dying during winter is to treat them properly during autumn. They should never spend more than two or three days in one paddock and should be rotated ahead of the cows through the best paddocks available. Good hay should be provided for them daily, especially when the feed is growing fast after autumn rains. Set-stocked calves should be drenched with phenothiazine as soon as scouring is noticed.

DRYING OFF DAIRY COWS

A dairy cow requires a reasonable spell between lactations and should be dried off at least six weeks before she is due to calve. This should be done even if she is still milking heavily. The drying-off process need not be prolonged; it is quite safe just to stop milking, provided any quarters affected with mastitis are treated with the usual course of three tubes of penicillin, the last tube being given after the cow is milked for the last time.

AUTUMN-SAVED PASTURE

Early calving cows are nearly always short of feed during July and August and often during September. In most seasons pasture is not growing fast enough during these months to meet the requirements of milking cows. Crops are expensive to grow and concentrates are even more expensive to buy. It costs nothing, however, to shut up pasture in the middle of April and let it grow for use in early spring. As much as possible of the dairy area should be shut up in this way. Advice regarding the best paddocks to spell and the best method of feeding the autumn-saved pasture by the use of electric fences can be obtained from local officers of the Department of Agriculture.

On hill country, paddocks should be shut up for autumn-saved feed to be used by breeding cows and ewes before calving and lambing. Mob stocking makes this feasible on most hill country properties.

PURCHASE OF HERD SIRE

If a new herd sire will be required this year, now is the time to make inquiries. The New Zealand Dairy Board issues a Sire Survey and Merit Register which gives the production of the daughters of all dairy sires which have been surveyed. Unfortunately very few progeny-tested sires are available, but the Register should be consulted and wherever possible a bull by a proven sire out of a merit cow should be selected. Bull catalogues are issued annually by the Herd Improvement Association, and these too should prove of considerable value to dairy farmers who are looking for herd sires. The New Zealand Dairy Board is now developing artificial insemination on a commercial basis, and farmers interested in making use of this service should get in touch with the local Herd Improvement Association.

DECEMBER-FARROWED PIGS

Litters farrowed in December should be sold as pork. If they are carried on to bacon weights, no milk will be available for the later litters, which will have to be sold cheaply as stores or wintered on expensive concentrates. Available root crops may be fed to sows, but they require supplementing with milk or meat meal. Crops of fodder beet quality or better may be used as part of the ration to fattening pigs.

CARE OF EWES

If rams remain with the ewes for more than four weeks, they should be raddled on the brisket so that the late lambing ewes can be drafted off. Once the ewes are in lamb the level of feeding should be lowered to prevent their becoming too fat. If the rate of stocking is increased during autumn, some paddocks can be shut up and pasture allowed to grow for grazing during the three weeks before lambing. These measures will greatly assist in reducing "sleepy sickness", which is more prevalent in fat ewes which are inadequately fed just before lambing. Ewes well fed during the month before lambing produce on the average ½ lb more wool per head than those which are underfed during this period.

CARE OF LAMBS

If the summer and autumn have been wet, lambs are likely to be suffering from worms. Drenching with fine-particle phenothiazine two or three times at monthly intervals will help. This applies particularly to the tail of the flock, which should be drafted off for special attention. Feed, however, is the most important consideration. During autumn lambs do best if grazed on pastures which have been allowed to grow to a height of 4 to 6 in. Hay aftermath and clover are very good. If these are not available, the lambs should be distributed thinly over the dairy paddocks or on hill pastures. They should on no account be concentrated in large numbers on short, rapidly growing pastures, especially if these have previously been grazed by ewes and lambs.

TUBERCULOSIS IN POULTRY

Though tuberculosis is uncommon in commercial poultry flocks, it is a disease quite frequently found in small farm flocks, where it may spread to pigs with consequent condemnations at meat works. If this disease is suspected, veterinary aid should be sought to eliminate affected birds.

Establishing and Topdressing Pastures

Seasonal Notes by the Farm Advisory Division

MANAGEMENT OF NEW PASTURES

MANAGEMENT of young pastures should aim at achieving a balance between grasses and clovers as quickly as possible. Early clover growth is encouraged by adequate fertilising to correct known deficiencies and then avoiding overdue shading and smothering of the establishing clovers by the quicker-growing grasses.

A disadvantage of the high-producing strains of clover and ryegrass in use today is that one can readily suppress the other, especially in the first season of the pasture's life. A common condition of new pastures, particularly on North Island dairy farms, is the vigorous growth of ryegrass in the first few months, which so smothers the young clover that a marked nitrogen deficiency can occur later, causing the grass species to go out, leaving the sward clover dominant for a season or so. This condition is accentuated if the young pasture is allowed to get away too long during the first winter and spring.

The ideal management is frequent quick grazing with large numbers of sheep or light cattle right through the first season, care being taken to give ample spells between grazings.

On dairy farms even the milkers should be used if necessary, as long as excessive pugging is avoided. Well established sheep pastures can be set grazed in the first spring as long as growth is allowed to come away before the onset of dry weather. Such management tends to clover dominance in summer, but this provides very suitable feed for finishing lambs or rearing hoggets, and is seldom harmful provided the paddock is spelled early in autumn to allow the grasses to recover before winter.

Troublesome weeds, especially docks and thistles, can get away in the best handled sowings, but can be reasonably well controlled with the weedkillers 2,4-DB and MCPB. However, it is necessary to delay spraying until ground cover is complete and to avoid spraying in wet, cold weather.

—*E. C. AYSON, Wairoa*

* * *

AUTUMN TOPDRESSING

THE fertiliser needs of the modern farm have become complicated. Some of the commonly used fertiliser elements are phosphate, potash, molybdenum, copper, and sulphur. However, cobalt is needed on some soils for stock health, while lime, widely used on clay and other responsive soils, is not termed a fertiliser.

Good responses from a fertiliser on one farm may not mean that a neighbouring farm will respond to the same fertiliser. The day of topdressing the farm as if it were one paddock is over. Paddocks on the same farm may vary and require more of this manure and less of another. Paddocks at the back of the farm and those cut regularly for hay may need much potash to which handier paddocks may not respond.

The local farm advisory officer of the Department can advise farmers how to get the best returns from topdressing.

—*G. B. HADDOW, Auckland*

* * *

NITROGEN TOPDRESSING IN NORTHLAND

NITROGENOUS manures can be applied in Northland to provide extra pasture growth for the winter and early spring period when it is scarce. These manures can be applied in May to improve the growth of autumn-saved pasture when paspalum is becoming dormant and perennial ryegrass and other grasses are making their late autumn growth. They can also be topdressed on the paddocks in July for early spring growth.

The extra growth generally begins two to three weeks after application and persists for about two to three months, depending on the weather and the amount of fertiliser put on.

With reasonable weather an increase of 20 per cent can be expected with 1 cwt of nitrogen per acre and up to 50 per cent with heavier amounts. A 20 per cent increase for two months on a fertile pasture may produce an extra 250 lb of dry matter per acre, equivalent to about 280 lb of a high-quality meal such as linseed or meat meal, costing £4 10s. at present prices.

With nitrogenous manure at 34s. a hundredweight the application of nitrogen to a pasture is payable, if it has a good proportion of ryegrass, cocksfoot, and the better grasses, and provided the soil is well drained and does not poach when intensively grazed.

—*C. E. BALLINGER, Whangarei*

* * *

AUTUMN-SAVED GRASS

AFTER tupping it is sound practice to restrict the grazing of the ewe flock to bare maintenance requirements and conserve as much as possible of the autumn pasture growth for rationing in late winter and early spring, when feed requirements are more critical. This can best be done under a rotational grazing system where several of the younger more vigorous fields can be readily dropped out from grazing and the flock rotated round the remaining older pastures. Areas to be saved in this way should have been adequately topdressed and on intensive sheep farms or dairy units the use of nitrogenous fertilisers to boost late autumn growth should not be overlooked. Applications of nitrogen should be made early to ryegrass-dominant swards to encourage maximum production for a month to six weeks before falling temperatures restrict growth.

Areas which have not been treated recently with DDT should be examined for the presence of grass grub or subterranean grass caterpillar. Both these pests can cause serious loss of production from now on and heavy infestations of subterranean grass caterpillar can devastate areas of autumn-saved grass. If caterpillars are found in the soil or if a close examination reveals their characteristic powdery castings on the surface, a DDT fertiliser mixture should be applied to the close-grazed dry pasture as soon as possible.

—*S. M. J. STOCKDILL, Palmerston*

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Duck Farming in New Zealand

Feeding and Management of Layers and Table Duckling Production

IN many respects laying ducks are fed similarly to other poultry. This article discusses the feeding and management of laying ducks and also deals with the production of ducklings for the table. It is the third and final article by F. C. Bobby, Chief Advisory Officer (Poultry), Department of Agriculture, Wellington, on duck farming in New Zealand. Selection of breeds was discussed in the January issue and hatching, rearing, and feeding of ducklings in the February "Journal".

Catching a duck with a net. Inset—Correct method of handling a duck.

DUCKS bred for egg production, in breeds such as Indian Runners and Khaki Campbells, can be heavy producers, averaging over 200 eggs per annum. Such birds, whether contained in a limited run or foraging over free range, require a full daily ration.

Though laying ducks will pick up a certain amount of food when allowed to forage over free range where there is a pond or stream, they still need a full daily ration of mash and grain to maintain heavy egg production. Ducks laying 20 to 25 eggs each weighing over 3 oz each month require a ration of 5 to 6 oz daily to maintain production without loss of condition.

It is common practice to feed laying ducks grain and mash. A good feed of grain (2 to 2½ oz per bird) may be given in the morning before the birds are released. Preferably this should be fed in a trough and not scattered over the ground on grass or in litter, as ducks shovel up their food and cannot peck at grain as do other poultry. A feed of wet mash should be given late in the afternoon or in the evening according to the time of year, allowing 2½ to 3 oz per bird.

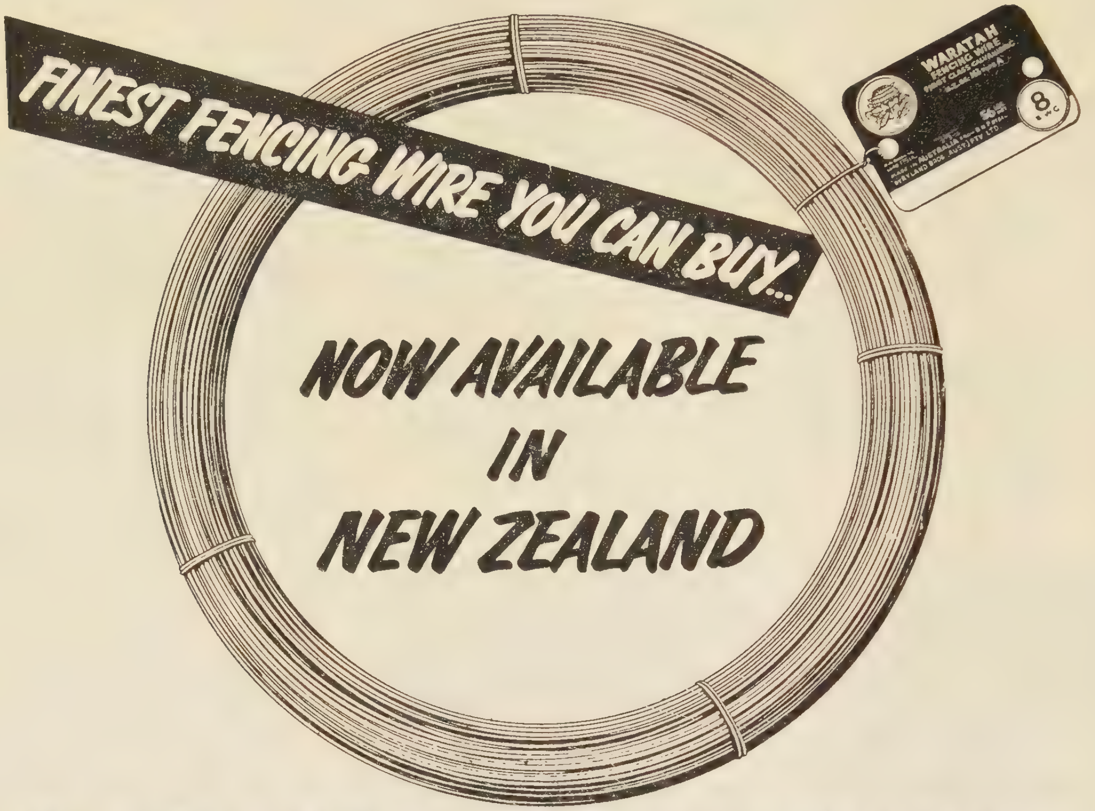
Any well balanced laying mash containing not less than 16 per cent of protein should be used. The birds should also have access to good-quality shell grit to aid good shell production. Where ducks do not have access to ample green feed throughout the year it is desirable to include dehydrated lucerne meal (5 per cent) in the mash to ensure satisfactory yolk colour in eggs.

Water

Ducks must be supplied with ample clean water at all times, preferably in drinking vessels which hold water sufficiently deep to allow the birds to immerse their heads. Such vessels are not necessary where ducks have access to a pond or stream. If drinkers are used, they must be kept clean and free from stale food accumulating as a sediment in the water. Stale, fermenting food in dirty drinkers can harm ducks, especially those being fattened for table purposes.

Accommodation

In the upper half of the North Island, where a temperate to warm climate without severe frosts is experienced, laying ducks require very little housing. On some farms none is given, but hurdles or some similar structure are erected in the runs where the birds sleep at night. Such structures afford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the birds protection from cold winds and driving rain.

Alternatively an open type of house or shelter may be used, with some protection in the front in colder districts. Ducks are easily contained in grass runs with 3 ft high wire netting, but as they are readily frightened by dogs or vermin at night additional protection may be needed under some circumstances. When frightened ducks panic and this will quickly reduce egg production.

Ducks do not require perches or nest boxes.

Management

Ducks are responsive to a set routine. It is normal for them to lay early in the morning, most eggs being laid before 10 a.m. Consequently the practice is to keep laying ducks in their grass run or house where they sleep at night until 10 a.m., by which time they will have laid their eggs. These will be scattered over the grass run or over the floor of the house if the birds are housed at night.

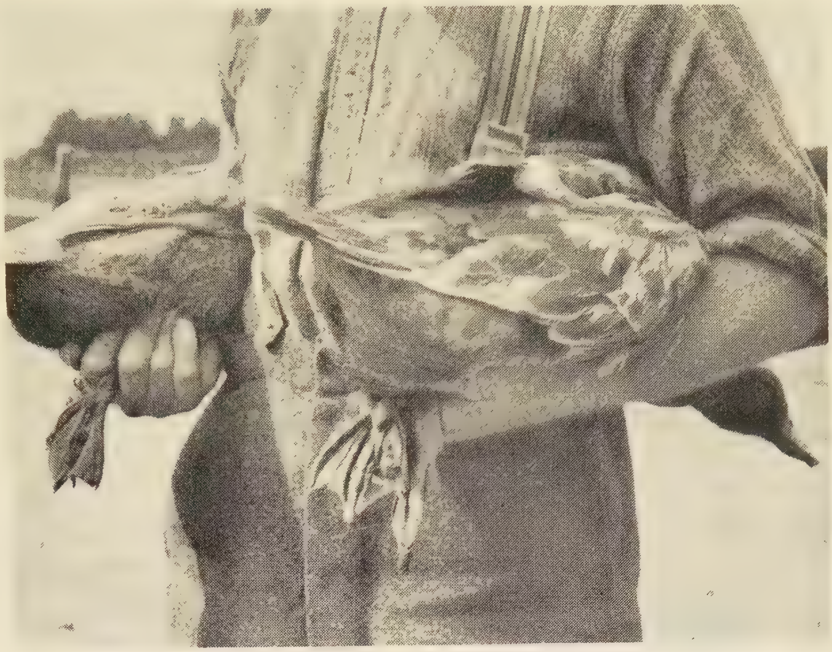
After 10 a.m. ducks may be released from their sleeping quarters and allowed to forage. If the afternoon feed of mash is given daily at the same time, ducks will soon form the habit of returning to their night run without any trouble. In fact, if they are not fed to time, they will congregate and voice in no uncertain manner their disapproval of being kept waiting for their meal.

When it becomes necessary to catch and handle ducks this should be done carefully because ducks are easily frightened and panic. If carelessly approached for catching, they will readily pile up in a corner of the run and smother one another. A net on a pole is useful for catching small numbers of ducks; otherwise they should be split up into small groups before being cornered for catching. When being handled and carried ducks should be grasped by the neck as shown in the illustration on page 239. They can be carried comfortably under the arm.

Disease

Disease among ducks and ducklings is not common in New Zealand and causes far fewer losses than in other poultry. If losses occur, dead birds should be sent to the Department of Agriculture Animal Research Station, Wallaceville, for examination.

A trouble sometimes experienced with ducklings during rearing is "sprawling" or going off their legs. This is usually due to some fault in management associated with overheating under the brooder or damp and cold conditions where the birds are running outside. Exposure to a cold draught will cause this trouble as will also exposure to hot sun where no shade is available, which causes a form of sunstroke. Leg weakness can also be caused by lack of vitamin E in the feed. Lack of vitamin E is most unlikely if good wheat is fed.



The under-arm method of carrying ducks.

Table Bird Production

There appears to be only a very limited trade in table ducks in New Zealand and most of the birds used are Muscovy ducks. These have dark flesh and when fully mature are of considerable weight. Muscovy ducks grow very rapidly up to the age of 16 weeks, when they are of 8 to 10 lb. liveweight and at their best for table purposes.

Overseas the most popular breeds of ducks for table purposes are Pekin and Aylesbury, but these ducks are difficult to obtain in New Zealand at present. Both have white or yellowish white flesh. They are at their prime for table purposes at about 10 or 11 weeks of age, when average birds weigh 5 to 6 lb.

Pekin and Aylesbury ducklings should be watched very closely when approaching the age of 10 weeks, as they must be killed and plucked before adult feathers break through the skin. Once this happens the birds become excessively stubbly and start to lose condition. In hot weather this can occur in 24 to 36 hours. If ducklings reach this stage, it becomes necessary to carry them on until they are fully feathered and back in proper condition before killing them. Such mature birds are not considered to be of the same eating quality as ducklings 10 to 11 weeks old.

Management

Ducklings for table purposes are reared in a similar way to those to be kept for egg production. (See last month's "Journal," pp. 184-189.) At about seven or eight weeks of age the ducklings should be split into groups for fattening. Between 25 and 30 is a suitable group to handle in a grass run without undue risk of panics and consequent piling up in corners. No housing should be necessary in spring, summer, and autumn.

When seven to eight weeks old ducklings should be put on to a fattening ration of high calorie value (almost entirely ground barley, ground maize, and ground oats). The grain used for grinding must be of first quality with a heavy bushel weight. The meals should be made into a wet mash with water and skim milk, if available; it should have a consistency similar to that of porridge. Five to eight per cent of meat meal may be added to the other meals.

If properly grown and fattened, a duckling at 11 weeks of age should be well filled with breast meat and the breast should be rounded with the keel bone little in evidence. If the keel bone is prominent and the breast hollow on either side of this bone, the bird is of poor quality and faults in management at all stages, particularly in the fattening period, should be looked for.

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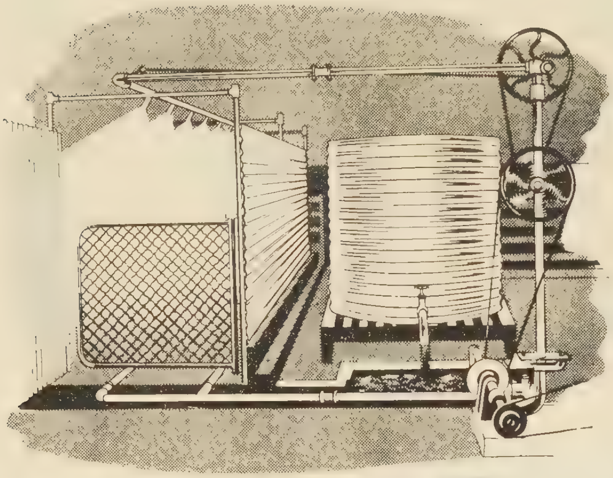

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Propagation of Lilac

VARIOUS methods are used in the propagation of lilacs, and different root stocks can be worked. Several kinds of privets, *Ligustrum* spp., are used in New Zealand, but there appears to be some confusion in commercial horticultural circles on the naming of these. Because the use of the correct stock has a very important bearing on the success of growing lilacs, studies of the various species in this group of privets have been made and a key has been designed for their identification by leaf shoots only.

PRIVET is the main stock used in New Zealand, but it is not used so much overseas.

Dutch growers commonly use a lilac stock, *Syringa vulgaris*, which is raised from seed and either budded or grafted. This stock, however, is not very satisfactory. Even from seedlings it can sucker badly and it is difficult for home gardeners to distinguish between growth from the scion and from the stock; consequently, a lot of small inferior flowers may come from the stock. Different lilac species are being tried as stock, *S. japonica*, *S. sweginzowi*, *S. reflexa*, and others; the results are said to be promising.

Syringa vulgaris and *Ligustrum ovalifolium*, the Californian privet, are used as stock in England, but layering is also carried out. Where a stock is used, grafting or budding low on the stock to facilitate rooting from the scion is recommended, after which the plants should be lifted and the root stock removed. The stock is then used only as an aid in propagation, own-rooted plants being the aim, as they are considered to be the best.

A greater range of stock is used in the United States of America. *Syringa vulgaris* and *Ligustrum ovalifolium* are the most common, but where the latter is not hardy *L. vulgare* is chosen instead. Green ash, *Fraxinus* sp., is also used. As in England, the purpose of the stock is to assist the scion to take root and the plants are lifted and the stock removed after rooting of the variety has taken place.

In recent years, however, American nurserymen have been dispensing more and more with the stock altogether and raising plants direct from cuttings. With improved methods in propagation this is now proving satisfactory.

New Zealand Methods

Propagation of lilac in New Zealand has in the past been carried out by budding on rooted privet cuttings, *L. ovalifolium* and *L. vulgare* both being used. *L. amurense* has also been tried, possibly due to incorrect identification, as it is rather similar in foliage and general habit to *L. ovalifolium*, but it has not been found satisfactory.

Cuttings are being tried now, but their development has not yet been observed against that of plants budded on privet stocks.

Comparison of Propagation Methods

Even if it is possible to raise plants from cuttings, other factors should be considered before that method of propagation is decided on. There are advantages and disadvantages with all methods and with the various kinds of stock which can be used. The main points are outlined here.

Cuttings can be raised in fairly large quantities from relatively few parent plants where good propagating facilities are available.

By T. W. RAWSON, Scientific Officer, Botany Division, Department of Scientific and Industrial Research, Christchurch, and K. H. MARCUSSEN, Horticulturist, Department of Agriculture, Christchurch

Plants from cuttings, as well as from layers, tend to sucker, but the suckers are of the same kind as the plant, and no inferior types of flowers will appear as when one of the lilac species is used for stock.

The time required for flowering of plants raised from cuttings varies according to variety. Observations in the United States of America are that some will begin flowering when they are four years old, others not until later.

Layering is quite satisfactory for raising own-rooted plants, but sufficient plants must be available in the stool bed to provide the need. It will take some years to develop a producing stool bed.

Low budding and removal of the stock entails much work, which is spread out over a number of operations. Cuttings of the stock must be prepared, rooted, and lined out; budding has to be done and the plants require special attention at that time; later on they must be lifted for removal of the stock and lined out again. There does not appear to be enough benefit gained by using this method, as compared to the raising of cuttings, to warrant the labour involved.

Budding on privet is done in New Zealand on fairly long stocks which are not removed. The lilac is not encouraged to root and any suckers from the stock can fairly easily be distinguished as such, both by the fact that they are suckers and by the different foliage.

This method has proved satisfactory when *L. ovalifolium* is used as stock and the plants usually begin flowering the first or second year after budding.

Most varieties will take on *L. vulgare*, but with some it is difficult and it suckers badly; in general it is not a desirable stock. There have been complaints that lilacs are short lived in New Zealand; probably such plants have been grown on *L. vulgare*, as overseas observations are that after some years this stock is not able to supply the plant with sufficient nourishment to sustain it.

Grafting on *Syringa vulgaris* is preferable to budding, as grafting can be done right at the base of the plant. The lower it is done on the stock the fewer suckers will result. Seedling stock should be used, not cuttings, which sucker badly. There are no overseas reports on any adverse effect on the lilac from this stock.

The Various Privets

There are four species of privet grown in New Zealand and each is described to assist in its identification.

Ligustrum amurense, the Amur River privet, is the least grown. It is a stiff, erect shrub reaching a height of 15 ft. The young branchlets and the inflorescence are hairy and so is the under surface of the midrib on the leaves. The leaves are 1 to 2½ in. long, oval or oblong, and usually have a blunt tip. The flowers, which are long and tubular, are placed in dense, erect, compound heads 1 to 3 in. long.

It is very similar in habit to *L. ovalifolium*, but can be identified from this by its hairiness. It is a native of China and Japan and is very hardy.

Ligustrum ovalifolium, the Californian privet, is fairly common, and is probably best known in the South Island in its variegated form.

It is an upright growing shrub reaching some 15 ft in height. The young branchlets and the leaves are entirely without hairs. The leaves are 1 to 2½ in. long, oval, and have an acute tip. The long tubular flowers are placed in dense, erect, compound heads up to 3 in. long.

There are several variegated forms. The best known is the Golden Privet, *L. ovalifolium aureo-marginatum*, on which the leaves are edged with yellow. It is a native of Japan.

Ligustrum sinense, the Chinese privet, more frequently known in New Zealand as the French privet, is a graceful shrub growing some 8 to

PROPAGATION OF LILAC . . .

10 ft high with slender, spreading branches. The young branchlets are densely hairy, as is also the under surface of the midrib on the leaves. The short tubular flowers are placed loosely in compound heads up to 4 in. long.

It is a native of China and Korea and the least hardy of the species dealt with.

Ligustrum vulgare, the Common privet or English privet, is an erect shrub reaching some 15 ft in height. The young branchlets are usually minutely downy, but not always right to the tips of the shoots; the leaves are without hairs. The leaves are narrow, oval, oblong, or lance shaped, and have either acute or blunt tips. The short tubular flowers are placed in erect, compact heads from 1½ to 2½ in. long.

This species is rather variable and one variegated form, *L. vulgare aureum*, is not uncommon. The young leaves are yellow on this variety, but as they mature they gradually turn green.

It is a native of Europe, North Africa, and Western Asia and is very hardy.

Identification of Privets

The key below aids identification without flowers; propagating material (cuttings) is usually taken in autumn and early winter, whereas flowering occurs in early summer.

The species most suitable for use as a root stock for lilacs, *L. ovalifolium*, is easily recognised by the total absence of hairs. (Note: *L. vulgare* is sometimes hairless on tips of shoots, but hairy on more mature wood.)

A hand lens should be used to help identification.

IDENTIFICATION OF *LIGUSTRUM* SPP.

Young shoots and leaves without hairs	*L. ovalifolium*
Young shoots with minute down, leaves without hairs	*L. vulgare*
Young shoots with prominent stiff hairs, leaves hairy on midrib beneath	
Young shoots sparsely hairy, branches stout, stiff, and erect	*L. amurense*
Young shoots densely hairy, branches slender and spreading	*L. sinense*

Book Reviews

"Scientific Principles of Feeding Farm Livestock"

THIS excellent book of some 250 pages is simply a record of the proceedings of a conference which was held in England last year to examine critically the feeding standards commonly used in Britain in the light of present knowledge of the nutrient requirements of domestic animals.

The conference was sponsored by the English farming journal "Farmer and Stock-Breeder", and organised by a committee which included representatives from farming, the feedstuffs trade, the veterinary profession, University departments, research institutes, and advisory bodies. The book includes a series of papers on dairy cows, sheep, beef cattle, pigs, and poultry, each prepared by an able scientist who is an acknowledged authority in the particular field covered. It also contains a detailed account of the useful and informative discussion which each paper evoked at the conference.

Much of the information in the book is very specialised and highly technical and cannot be directly applied by the grassland farmer in New Zealand. However, the book does provide an authoritative, convenient, and up-to-date summary of the energy, protein, mineral, and vitamin requirements of farm animals, and in consequence should prove extremely valuable to university lecturers and research personnel, particularly those interested in energy metabolism. —*L.R.W.*

Farmer and Stock-Breeder, London. 50s.

"Beef Cattle Husbandry": Allan Fraser

THE publication of this very readable and stimulating book coincides with an increased interest in beef cattle in this country.

Though the text is written entirely for British conditions, the New Zealand student and beef enthusiast will find many interesting passages, and the chapter dealing with recent scientific developments should be widely appreciated.

The book is largely devoted to a comprehensive discussion on the origin and development and uses and limitations of the many breeds used for beef production in Britain. Some of the more important foreign breeds are also described. —*R.M.G.*

Crosby Lockwood and Son, Ltd. 21s.

Pests and Diseases of Citrus

SUCCESS in citrus growing is based on two main principles: first, to maintain in the tree a balanced and steady rate of growth, and second, to keep the tree free from diseases and pests.

Growers must be able to identify pests and diseases so that they can give the right treatment, and to assist in both these aims the Department of Agriculture has recently revised and reprinted Bulletin No. 20, "Citrus Pests and Diseases in New Zealand", a handy little book for the grower to keep close at hand for quick reference.

It describes the most destructive insect pests such as aphids, borers, mites, and the scale insects and fungous, bacterial, virus, and physiological diseases.

Numerous illustrations aid identification of pest and disease symptoms, which are also listed in a diagnosis table.

Sections on treatment and disinfection of tree wounds, preparation and use of sprays, and a general spray programme are also included.

The bulletin may be obtained for 1s. a copy at all main offices of the Department of Agriculture.

A. and P. Show Dates

THE following are dates and venues of A. and P. shows up to the end of April:

NORTH ISLAND

March

*19 March—Wellsford at Wellsford.

SOUTH ISLAND

March

19 March—Upper Clutha at Wanaka.
19 March—Methven at Methven.
19 March—Hawarden at Hawarden.

April

*2 April—Oxford at Oxford.
9 April—Malvern at Sheffield.
18 April—Strath Taieri at Middlemarch.
*18 April—Mackenzie County at Fairlie.

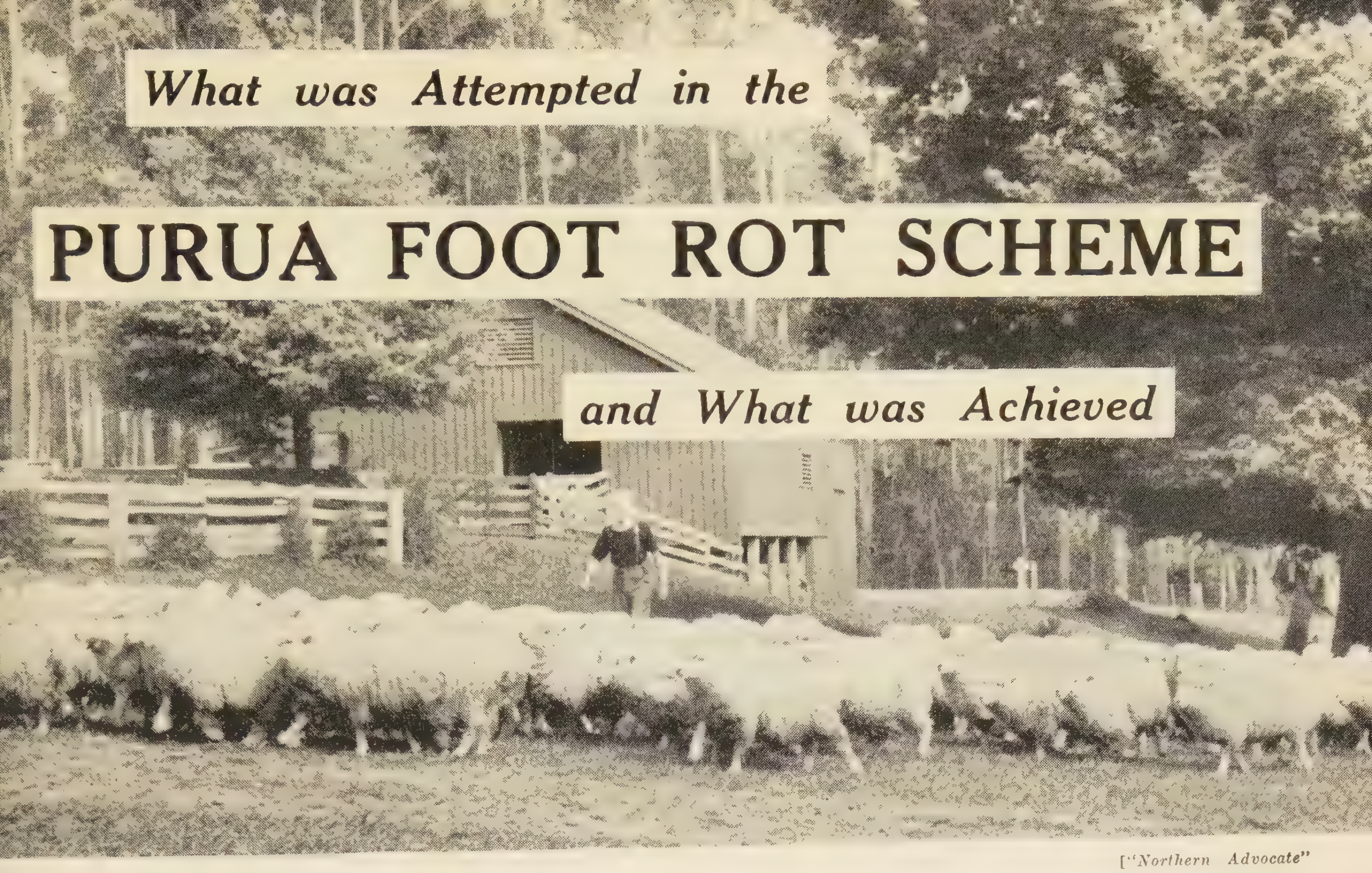
* The Department of Agriculture exhibit will be staged at this show.

Winter Show Dates

10, 11, 12, 13, and 14 May—Southland at Invercargill.
26, 27, 28, 30, and 31 May—Otago at Dunedin.
31 May, 1, 2, 3, 4, 6, and 7 June—Waikato at Hamilton.
9, 10, and 11 June—Te Kuiti and District at Te Kuiti.
15, 16, 17, and 18 June—Taranaki at New Plymouth.
21, 22, 23, 24, and 25 June—Whangarei at Whangarei.
25, 26, 27, and 28 August—Whakatane at Whakatane.

* The Department of Agriculture exhibit will be staged at this show.

What was Attempted in the PURUA FOOT ROT SCHEME and What was Achieved



["Northern Advocate"

IN 1955 a trial was designed and put into operation at Purua, North Auckland, to test the effectiveness of the Beveridge method for the control of foot rot in sheep under ordinary farm conditions in a region of high summer-autumn rainfall, as many farmers believed that this method was not entirely satisfactory in North Island environments where the climate was wet.

By A. BRISCOE MOORE,
Pipiwai, and
C. R. ENSOR,
Livestock Superintendent,
Department of Agriculture,
Palmerston North

PURUA was chosen for the foot rot control trials because it is isolated by topographical features from surrounding districts, it has a high summer-autumn rainfall, which resulted in persistent wet conditions underfoot, and the farming community showed readiness to cooperate. The area was considered a most difficult one for foot rot eradication, with soils ranging from rolling, wet puggy gumlands, to steep clays, and volcanic hill slopes usually covered with lush pasture in spring and autumn.

The rainfall, which is the most important single factor favouring the disease, averages 64 in. annually, being well spread throughout the year, so that only in exceptional seasons will the ground become really dry.

HEADING PHOTOGRAPH: Mr A. Briscoe Moore drafting sheep for foot rot investigation.

The New Zealand Wool Board, having for some years urged the development of improved control measures for the diseases affecting the hoofs of sheep, gave these trials its full support. The 26 Purua farmers unanimously decided to participate actively in the programme for control on their own farms, as designed by the Animal Industry Division of the Department of Agriculture. The Department supplied the supervision, the Wool Board the materials, and the participating farmers the labour and facilities. The whole activity was on a team basis, with neighbouring farmers combining to help each other.

Methods

The methods used at Purua involved the following:

(a) The fencing on each farm was made sheep proof.

(b) Provision for spelling and for clean access to sufficient paddocks to hold all sheep after examination was made on each holding. The spelling period was a minimum of two weeks.

(c) Examination and paring of the feet were done on the shearing shed floor, cradles being used, and access was provided from the counting-out pens to the drafting race and footbath. Clean access from the footbath to the spelled paddocks was important.

To achieve the all important thoroughness of paring cradles were found to be essential. Paring was done by operators working one or two to a cradle, the supervisor then closely checking every hoof before sheep were

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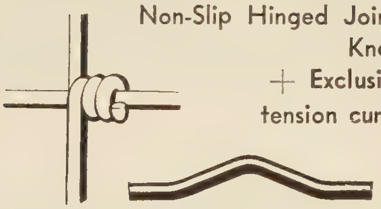

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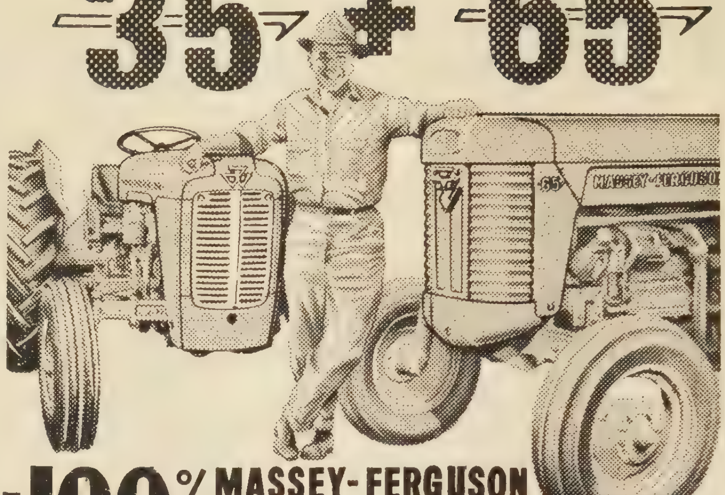

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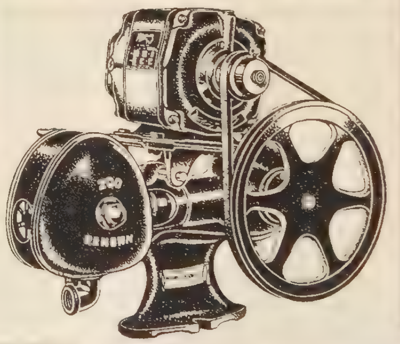

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released. Most careful paring of all traces of diseased tissue was found to be necessary to secure a high percentage of cures, even if bleeding was unavoidably caused at times. It cannot be sufficiently stressed that thorough paring is the most important stage in any treatment designed for foot rot control.

After the sheep had been examined by the supervisor and while still in the cradles they were marked to show whether they were clean or infected, and later were drafted into clean or infected groups.

The clean sheep were put through footbaths and removed to clean, spelled paddocks. The infected sheep, after footbathing, were retained in clean, spelled paddocks handy to the shed, so that they could be put through the footbath regularly (even daily) for the ensuing two to three weeks before re-examination. A 10 per cent solution of formalin used in the footbaths was considered to be the most effective material for this purpose. Every two or three weeks the infected sheep were re-examined, pared, and footbathed, if necessary, until they were cured.

[*Embassy Studios*

C. R. Ensor (left), and R. E. Burnell, Livestock Instructor, discussing a paring technique.

[*"Northern Advocate"*

▼ R. E. Burnell (left) and A. W. Alison, Purua, trying out a new type of cradle.

Those sheep displaying no infection were transferred to a clean, spelled convalescent paddock, where they remained for a further three weeks. If at the end of this period they were still clear of foot rot, they were returned to the clean flock.

There were always a few sheep which were difficult to cure, but with persistence they could apparently be freed from infection.

Effectiveness of Trials

In the first year in the 25,000 sheep dealt with the incidence fell quickly from 50 per cent to less than 5 per cent and has continued at this average figure in subsequent years. The first season's operations cleared foot rot completely from six flocks. One of these was reinfected a season later through introduction of a line of infected lambs and three seasons later another showed some few infections, the origin of which could not be traced. During the last two seasons another flock was added to the clean list.

The results demonstrate that the methods used at Purua are not yet successful enough to ensure eradication of foot rot by the average sheep farmer under these wet conditions.

Though Purua experience has shown that foot rot can be cured in individual sheep by these methods, the problem is the perpetuation of foot rot in flocks through the inability to detect with certainty by visual methods occasional small foci of infection.

The difficulty is one of diagnosis. Those few sheep whose hoofs carry infection which escapes detection are responsible for the recurring cycles of foot rot. Undoubtedly the persistence of moist conditions at Purua greatly contributes to this; in a drier climate such persistence is much less common.

Unless a treatment using some medicament with considerable penetrating power is obtained to overcome these deficiencies in detection, a new approach to treatment will have to be considered. Those chemical substances at present available as bactericides,

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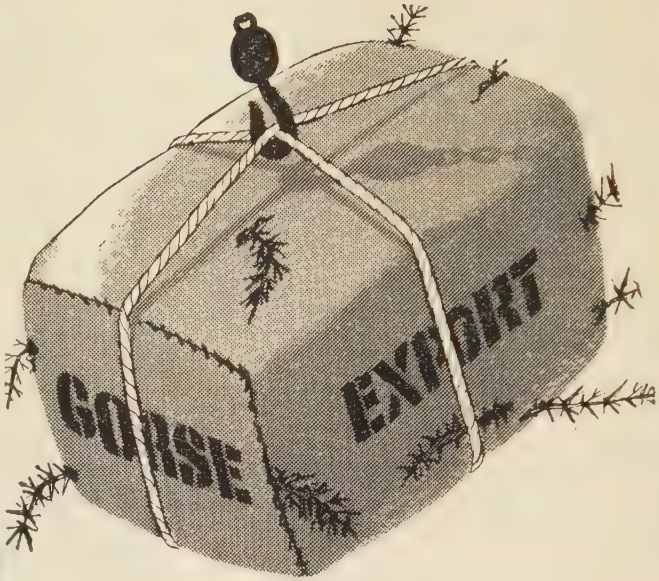

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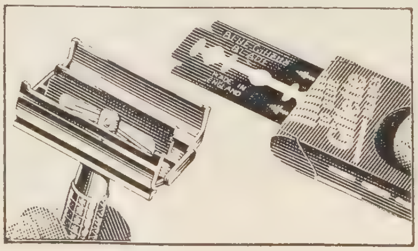

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and which possess deeper penetrating power, are too destructive of live tissues to be considered for use.

A new substance may yet be evolved which will inhibit the growth of the foot rot organism (*Fusiformis nodosus*) in the layer of the hoof where the organisms are found and which is beyond the normal reach of antibiotics used today when administered by injection or by mouth.

At the end of 1958, after an appraisal of the progress made on the original group of farms, it was decided to alter the previous policy and programme. In 1959 a special group of six farms was selected for more intensive experimental work in a further effort to produce a workable scheme for eradication under Purua conditions. This involved detailed work on areas of hoof affected and the reasons for the continued survival of the organism in the hoofs of those few sheep which remain infected after careful routine treatment.

Operational Research Group

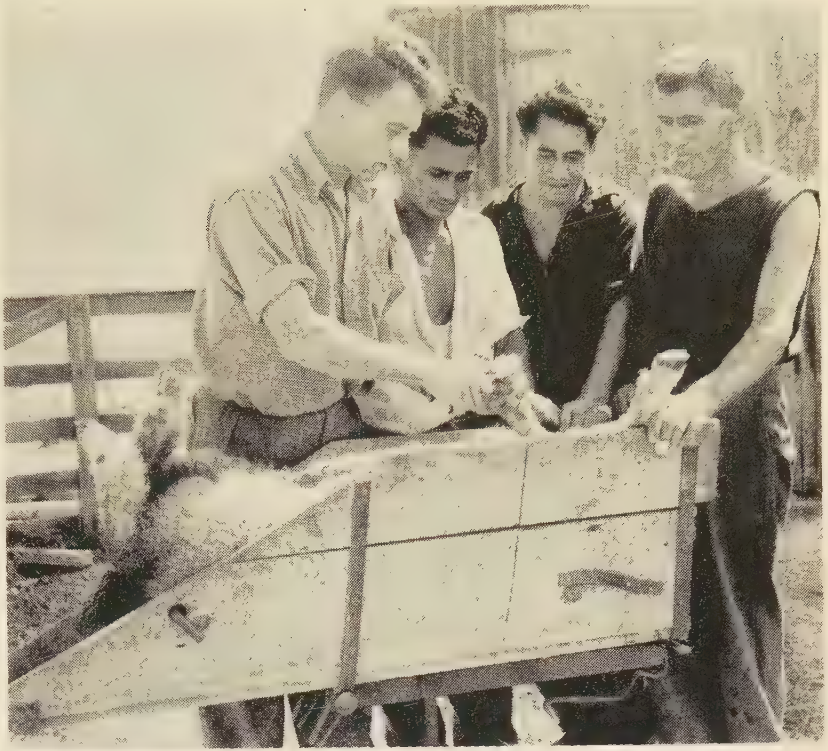
Late in 1958 an operational research group was set up by the Department of Agriculture to promote the study of all foot diseases of sheep in New Zealand. It consisted of a Veterinarian in charge of the field control work, a Veterinarian working on research at Wallaceville, and two Livestock Instructors, one of whom is in charge of the Purua scheme. However, as a result of staff changes within the Department the whole organisation is being reconstituted so that this valuable work will be continued.

The present methods of foot rot control have worked successfully on many farms in areas with a low summer-autumn rainfall, but need further investigation before a suitable method is evolved for areas with a high summer-autumn rainfall like that at Purua.

Acknowledgment

The assistance of all farmers in the Purua area who have cooperated so willingly in the trials is acknowledged by the Wool Board and the Animal Industry Division of the Department. It is felt that though foot rot has not been eliminated from all farms in the area, these farmers have appreciated the substantial drop in incidence and its beneficial effect on their flocks.

PURUA FOOT ROT SCHEME



[*Northland Photography*

H. R. Bouvard, Livestock Instructor (left), instructing on paring.

Digging Commercial Potato Crops

POTATOES are one of the most expensive crops to produce in New Zealand, and therefore every care should be taken during harvesting to ensure that losses through damage are reduced to a minimum and that a high-quality product is available for marketing.

Early digging should be confined to potatoes required for immediate use. Digging of the main crop should not be started until the crop is mature and the skins have hardened. It is usually wise to wait until autumn rains or early frosts have cooled the soil, because tubers lifted from warm, dry soil are not only more easily damaged but are also more susceptible to soft, wet rots.

In frosty weather digging should never be started until the ground has thawed out; failure to observe this precaution usually results in frosted tubers and a line of potatoes which cannot be marketed until all affected tubers have rotted sufficiently to enable them to be recognised and removed.

Great care should be taken with digging, as potatoes are very susceptible to damage during this operation. The digger should not be operated at too great a speed, and agitation of the aprons should be sufficient only to separate soil from the tubers. Damage can be minimised in dry soil by removing the back apron. Where the ground is wet or weedy speeding up of the apron results only in increased damage; hanging a spare length of apron over the front elevator to break up the soil is preferable.

The depth of the digger should be adjusted as required to avoid cutting of the tubers, and the wheels of the tractor and digger must not be allowed to run over undug rows and crush the potatoes.

Physical damage to potatoes, however slight, will permit the entry of fungus spores and, depending on storage conditions, can result in severe losses through dry rot and secondary bacterial soft rots.

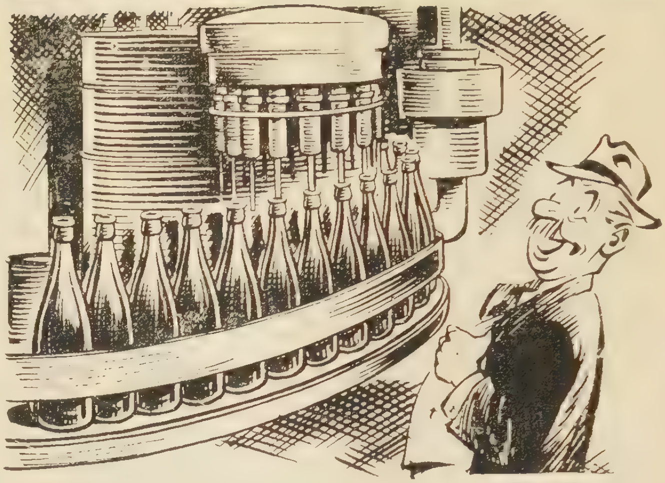
Tubers should be allowed to dry before bagging. Rough handling into baskets or buckets and hard dumping of sacks should also be avoided at all costs.

To minimise damage from potato tuber moth bags should be sewn as soon as possible after bagging of potatoes.

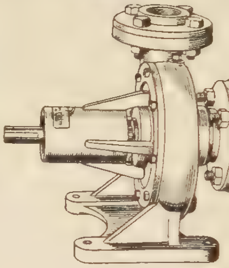
Haulms should never be used to cover untied sacks.

—W. A. R. MILLER,
Seed Certification Assistant,
Department of Agriculture,
Waimate

DAD and DAVIES COME TO TOWN



Yes, Dad's been having a look round town lately, particularly at the bottling plants . . . after all, you can't gainsay that a lot of nice things come in bottles . . . and he is pleased to see that Davies are doing a good job of work pressure pumping. Although it is only a small part of the bottle-filling machine, Davies' pressure pumping enables the whole machine to work and to get the right degree of pressure necessary for correct filling . . . and because of the reliability of Davies' pumps there is no chance of a holdup. If you have got a problem of pressure pumping, whether it is water, filling of bottles, cleaning or in fact any operation which is done under pressure, then we can help you. Our advice is free, so why not call, phone or write us, or any of our agents, and we will be only too happy to help you with your problems.



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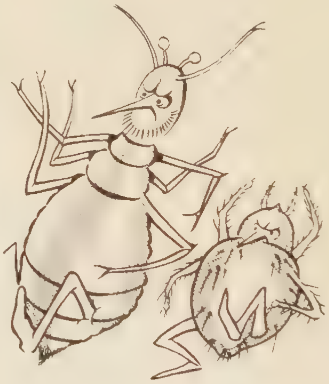

World wide trials have proved Rogor 40 a quick, safe, effective killer of damaging aphids, spider mites and thrips. It combines low toxicity to human beings with true systemic and persistent action against this wide range of pests of fruit and vegetables. Now you safely spray fruit and vegetables closer to harvest with Rogor 40—one of the most thoroughly tested chemicals from the human health safety angle. The sale of Rogor 40 is restricted to Commercial Growers only for use on

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Pig Housing: Its Influence on Production

AS the dairying season draws to an end many farmers will be aiming to make improvements to their piggery before the cows come in again. Other farmers may have pig housing which has some value as shelter, but is really disheartening to work in. Successful pig farmers realise that housing designed to save piglets, to reduce wastage of food, and to allow convenient working is essential. Some important features of pig housing are discussed in this article by E. D. EDWARDS, Research Officer, Department of Agriculture, Wellington.

THERE is ample evidence that new housing will not ensure profits with pigs; yet profits can be made by some farmers with quite simple and improvised accommodation. This fact emphasises the importance of management.

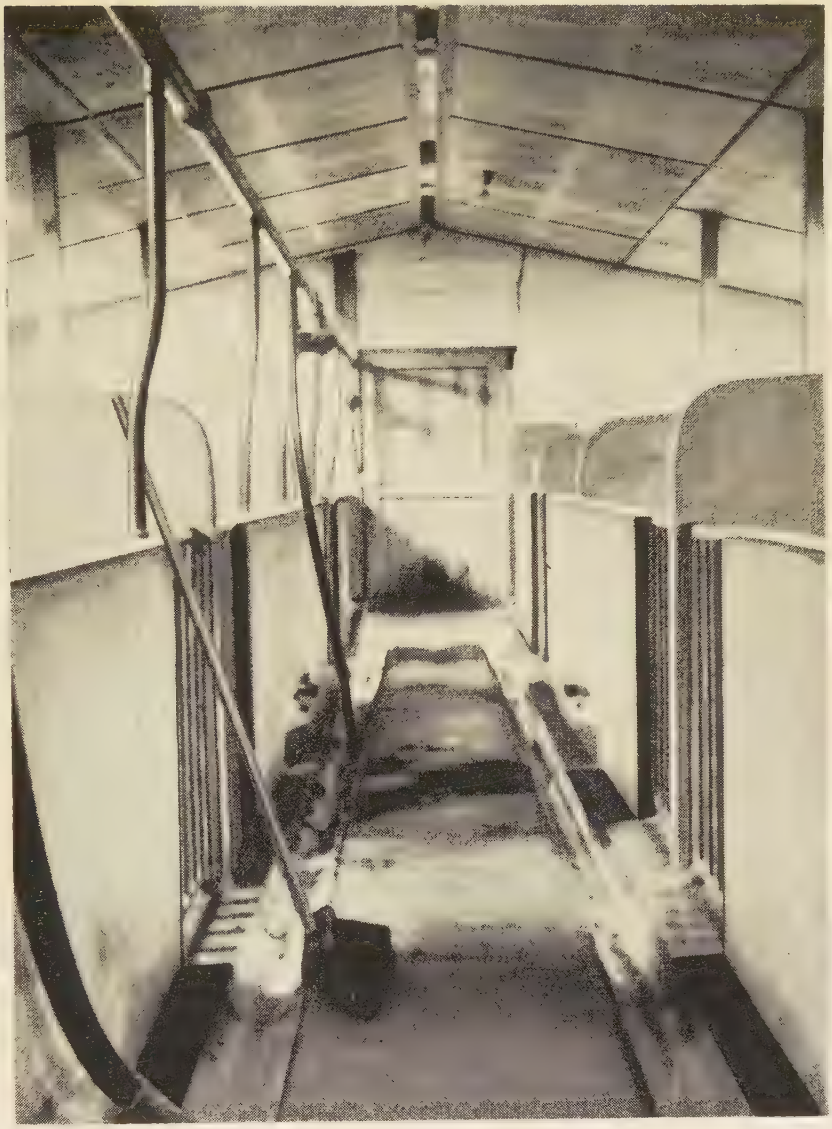
However, new housing tends to stimulate interest in the pigs, especially in feeding for rapid growth. Generally pigs confined to pens in well insulated houses require less food to maintain growth than they would in relatively poorly insulated houses and with continual access to paddocks.

On many farms where new fattening accommodation has been built the effect of overfeeding on liquids is very soon observed and unless this is checked the pigs and houses become filthy, losses occur, and interest fades. It may take one season or even two to arrive finally at the level of feeding which gives best results. Once the art of feeding is mastered the house begins to receive praise and it becomes a pleasure to look after the pigs and tally results at the end of the year.

Problems Affecting Building Policy

When a dairy farm is being developed provision of an efficient piggery is usually delayed for some years until the dairy farm is sufficiently developed. During this time the pigs have, on balance, probably proved a hindrance to development. Quite a few farmers, however, on taking over a farm have put their piggery in order from the start to benefit from the profits and convenience of working. To suit this approach there are designs of housing which may be extended to increase efficiency as finance permits.

Much will depend on the size of the farm and the permanence of the piggery. Where tanker collection of milk appears inevitable it may be desirable to construct buildings which can be used to store hay or other material as well as serving as a piggery, or piggery buildings which can be easily adapted for other use if pig keeping can no longer be carried on. However, such versatility is gained at the expense of efficiency.



Interior of fattening house designed and built by Mr I. B. Julian, of Kakaramea, South Taranaki. To prevent draught about the sleeping quarters there are no ventilation openings in the vicinity of the beds and division walls are high. In 1957 Mr Julian produced an estimated 37 lb of pigmeat per 100 lb of butterfat using whey and barley meal as his major foods. This is exceptionally good pigmeat production with whey and shows what can be done with an enclosed house of this type.

Principles of Good Housing

To maintain health and allow economical growth in pigs housing must be free from draughts and ensure warm, dry conditions, particularly about the sleeping area. Air temperatures in houses show considerable daily fluctuation. The problem is to reduce this fluctuation to a minimum so that conditions are comfortable for the size of pig being housed, but at the same time to have conditions under which pigs can be managed conveniently.

Newly born pigs thrive best in temperatures between 70 and 80 degrees F, but when they are a week old or if well grown, will thrive at 65 to 70 degrees. Access to a cooler area is actually beneficial to health after the early period and it fits in with our

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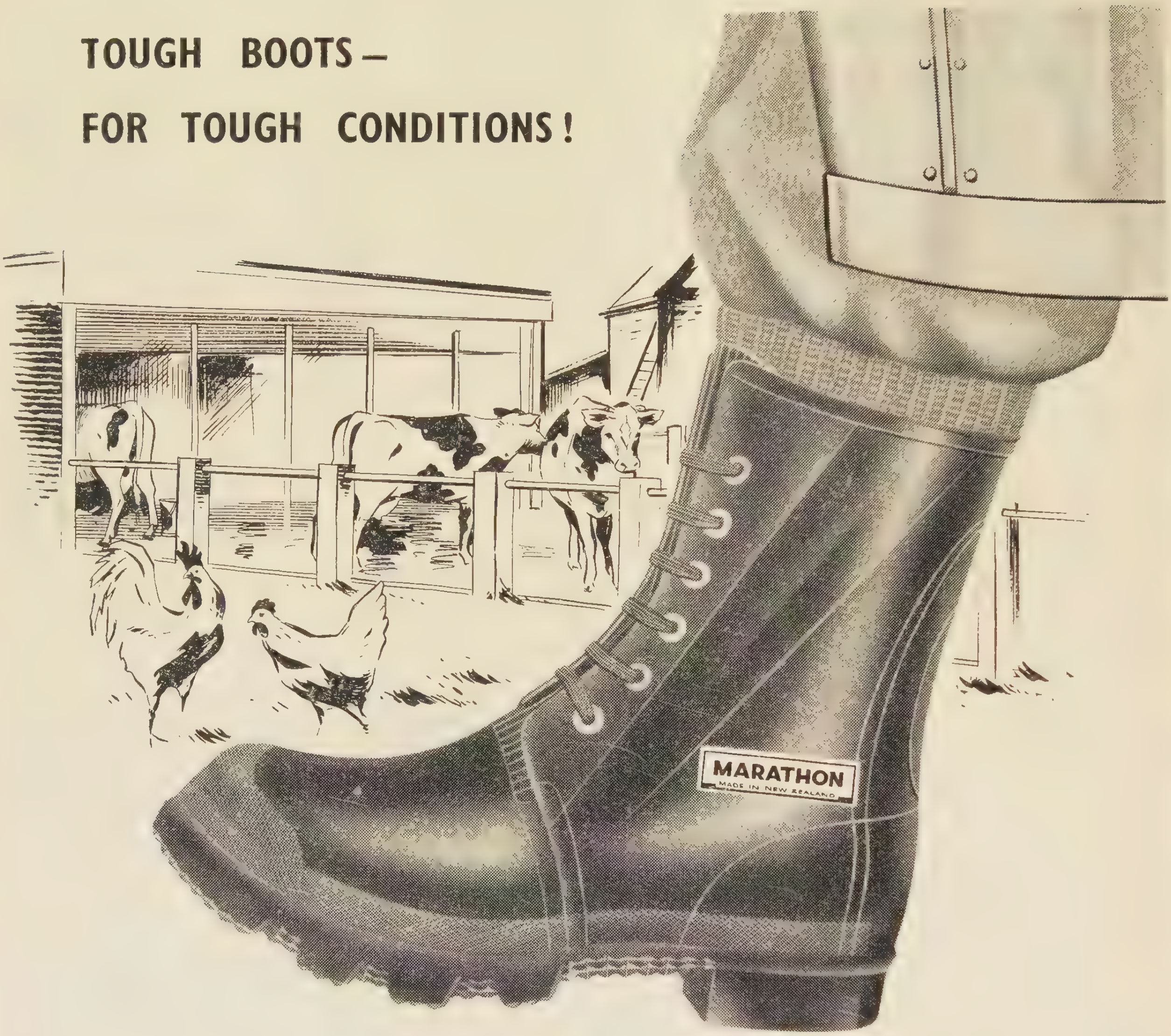

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usual practice of providing a run on clean ground to counter anaemia.

Weaner pigs, too often neglected, must also have warm accommodation. It pays handsomely because there is a tendency to overfeed weaners on liquids, and such feeding is most severe on badly housed pigs. Fattening pigs should be housed at temperatures of 60 to 65 degrees.

The aim should be to reduce the indoor variation in temperature to less than half the daily variation outside. This is achieved more easily in multi-unit houses, especially those which are fully enclosed. In most of the pig houses throughout New Zealand there is insufficient control over temperature and in summer temperatures indoors may fluctuate more than outdoors.

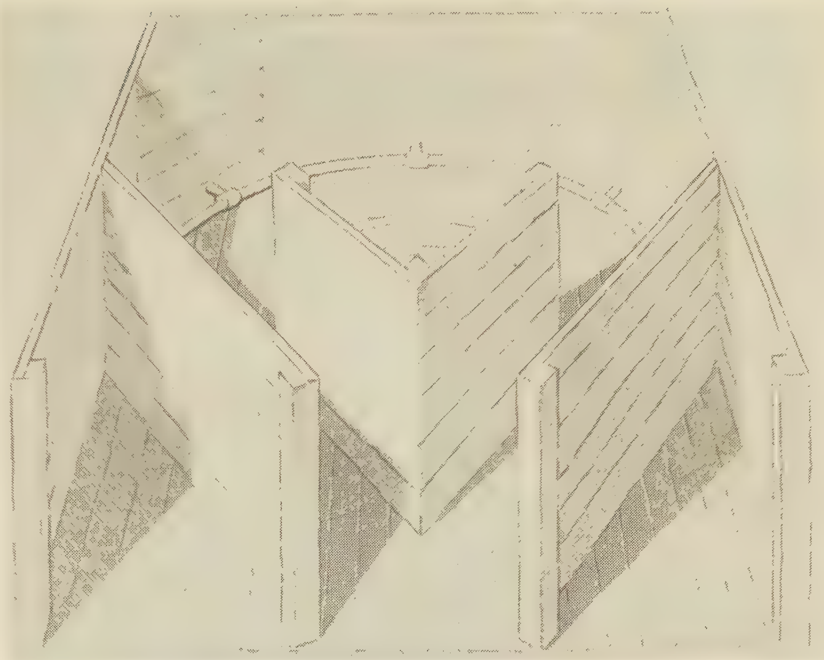
Quite a large number of farmers now use thermometers to check conditions in fattening units; many more could do so with advantage. They would find temperatures about the sleeping floor most unpleasant for a human being, yet optimum temperatures for man and pig are very similar.

Choice of Materials

The largest transference of heat through the structure of a house occurs in the roof. This heat loss can be reduced to a reasonable amount by lining the roof with treated softboard, hardboard, or timber or other waterproofed insulating material. Another method of conserving heat is to have a lower roof where convenient to reduce the quantity of air which has to be heated within the enclosed area, particularly the sleeping quarters. This reduces building costs somewhat and has proved successful with some designs, but it seems likely, particularly with single-unit houses, that its value may be limited by insufficient insulation and control over ventilation.

The trend in wall construction, as in floors, has been to use permanent materials in preference to wood. These materials reduce maintenance, should permit more hygienic conditions to be maintained, and with most designs are really desirable. However, the insulating value of the materials commonly used is no better (and with dense concrete much poorer) than that of sound timber construction.

One inch thickness of timber gives insulation equivalent to 2 in. of pumice concrete, 6 in. of hollow concrete or coke breeze blocks, and 14 in. of dense concrete. Two points are now apparent: The first is that dense concrete should not be used about sleeping quarters when materials of higher insulating value serve equally well. The second is that where timber units are in use or can be used effectively within the system of pig keeping adopted, they can provide very satisfactory sleeping accommodation. In the main they will be single-unit houses and they are perhaps more common than any other type. Houses in which roofs are lined with insulating material, walls are sound and draughtproof, and ventilation is adjustable are quite suitable for farmers with small herds.



The round farrowing house is now being built in a variety of patterns and materials. Illustrated is a simple adaptation of a conventional 8 ft x 8 ft house to satisfy all the requirements of the round farrowing house, which was designed to prevent piglets being overlain.

Types of Housing

There are three major types of houses: 1, fully enclosed houses; 2, houses with outside yards; 3, houses in paddocks. Each type may have a dual purpose or specialised function and houses in paddocks may be portable. For herds of more than about eight sows a concentrated layout is essential for efficient use of labour and equipment; fully enclosed units or units with an outside yard are mainly used.

Though the size of undertaking, climate, and site have to be considered before the type of housing is decided on, success depends in the long run on the overall efficiency of management, so that it is wise when investing in new housing to recognise that management is usually the weak link.

The really keen pig producer would probably do well with any of the three types of housing, but could expect the fully enclosed units to be most profitable. The man who is less keen would be suited better by a layout in which pigs have access to yards and/or paddocks, as the pigs are less likely to suffer from faulty feeding and cleaning methods. Properly managed, this type of layout should prove adequate for most farmers.

Specialised Dual-purpose Accommodation

Houses which can be used for farrowing or for fattening have suited pig farming in New Zealand in the past, because their utility value was more important than efficiency in the disposal of dairy by-products. However, to obtain satisfactory returns from the labour and capital involved in the piggery it is becoming more and more important to save as many pigs and as much food as possible. There are four phases in production in which specially designed housing will assist in increasing efficiency: Farrowing, rearing, weaning, and fattening.

Farrowing Accommodation

The larger the piggery is the more scope there will be for special farrowing accommodation, but on any farm first consideration should be given to farrowing accommodation, since most deaths occur at this stage. The round farrowing house was designed primarily to reduce deaths from overlying by the sow, which is generally the chief cause. It is being used successfully by many farmers and its principles can be used in more orthodox accommodation.

The chances of pigs being overlain are greatest with pigs of low birthweight and those unable to get enough

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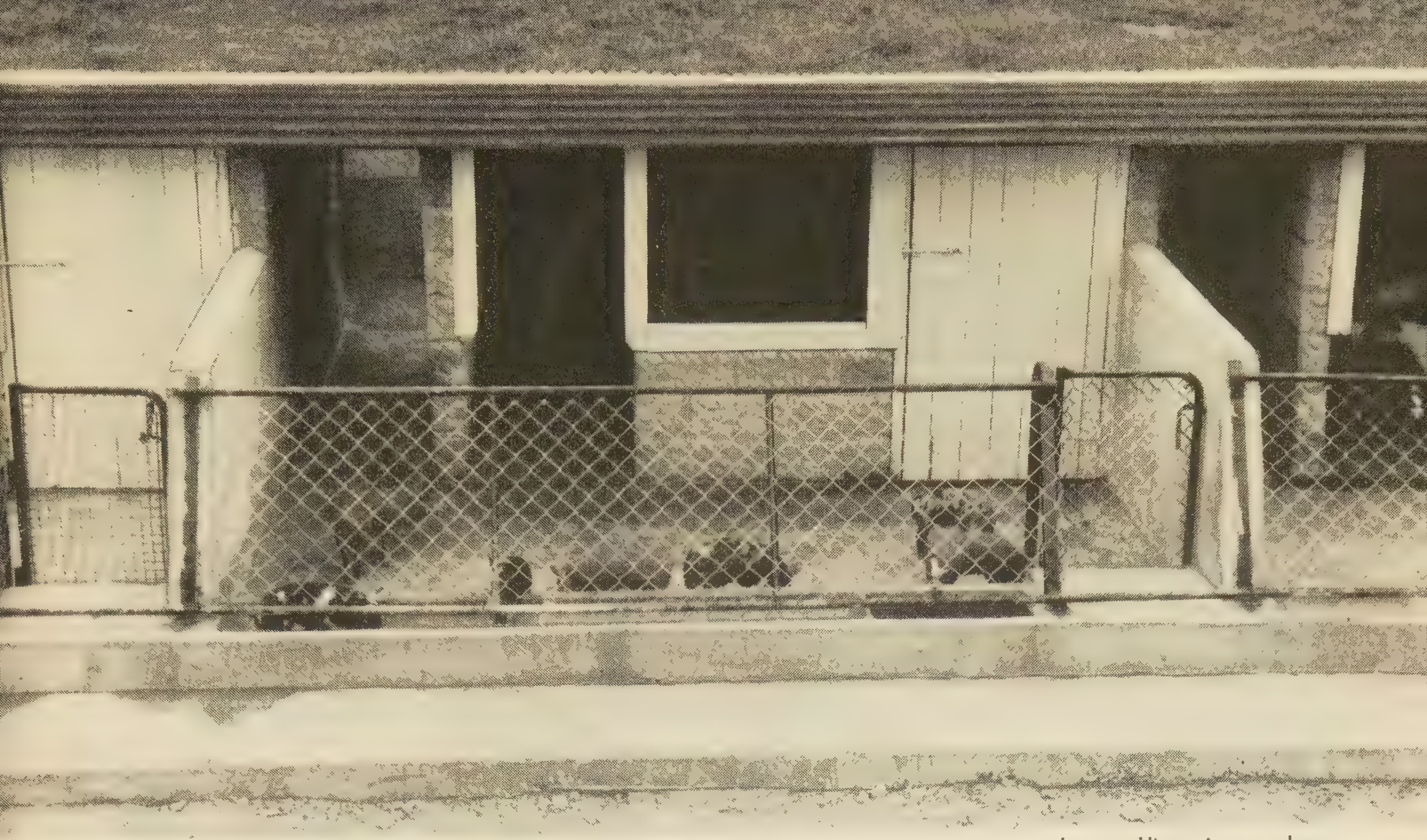

These units may be used for all purposes. Behind the closed door in each unit is a creep area where suckling pigs can be encouraged to take extra food without coming outside. The door gives easy access for refilling of the creep with meal.

milk. A special maternity house may keep these pigs alive, but it should not be expected to offset bad sow management.

The essential features of a farrowing house should be complete freedom from draughts, a warm, dry, and clean bed for the litter (protected from the sow), and a slightly cooler region for the sow.

Rearing Units

Units where suckled pigs are reared may be of dual-purpose construction, provided both sow and litter have access to good pasture. It has been claimed that pigs fattened in the house in which they were reared reach marketable weights at least a week earlier than pigs moved to other quarters at weaning. That may be so, but the important thing under New Zealand conditions is for the litter to have continual access to meal in a creep protected from the sow and preferably under cover, and at weaning the sow should be taken from the litter, not the litter from the sow.

Rearing of early weaned pigs certainly calls for special attention if not special housing. As yet early weaning is not practised on a large scale in New Zealand and is found to be most successful when begun at the three to four weeks' stage; hence buildings have been adapted for the purpose. Correct feeding is most necessary, though access to pasture need not be given if pigs had it before being weaned. Warm quarters can be provided either by installing an insulated kennel within the house or using plenty of hay or straw. Farmers who are anxious to intensify pig production will find early weaning advantageous.

Conditions for Weaning

The farmer who gives early weaning a fair trial is usually a good stockman. Many farmers practising normal weaning, however, do not appreciate the need for better treatment of weaners. Feeding is most important. More meal should be fed to them than is commonly used and if 30 lb of meal per pig was fed before they reached 14 weeks of age, much of the ill health prevalent would be prevented.

The better the housing is the greater of course will be the response to good feeding methods. Weaners when well fed will thrive under quite cool conditions **provided** the temperature is steady and there are no draughts. These conditions are not easy to achieve, so it is wise to aim for warmth. Units specially designed for weaners take into account the smaller floor space requirement than for older pigs and the greater need for a comfortable, dry bed.

The dual-purpose or fattening pens can be modified to meet these requirements by use of insulated kennels, bedding, and timber to restrict the bed area.

Fattening Units

The objective in fattening is to get the pigs off to the works in the shortest possible time with a minimum of food to yield a quality carcass. How important is breeding in this objective?

American studies show carcass length to be 60 per cent inherited, backfat thickness 50 per cent, feed efficiency 25 per cent, and 154- and 184-day weights 20 per cent, but litter weaning weight only 5 per cent inherited.

Breeding has an important influence, but under our conditions management is much more important. The producer who has already reached a high standard of management can benefit from carefully selected stock; other producers should concentrate on improving husbandry and housing and aim especially at rearing good weaners. The fattening process is perhaps better called the finishing process, because our baconers are being killed at comparatively light weights and 50 lb weaners are within the scope of many farmers.

The fully enclosed house in which pigs are confined is likely to prove more efficient in New Zealand than the other types mentioned. This has been found to be so in England in respect of feed efficiency as is shown in the following table.

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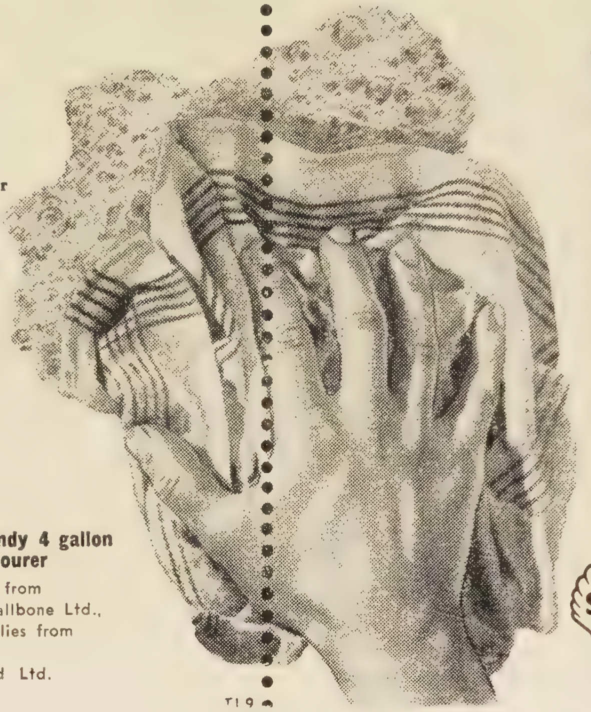

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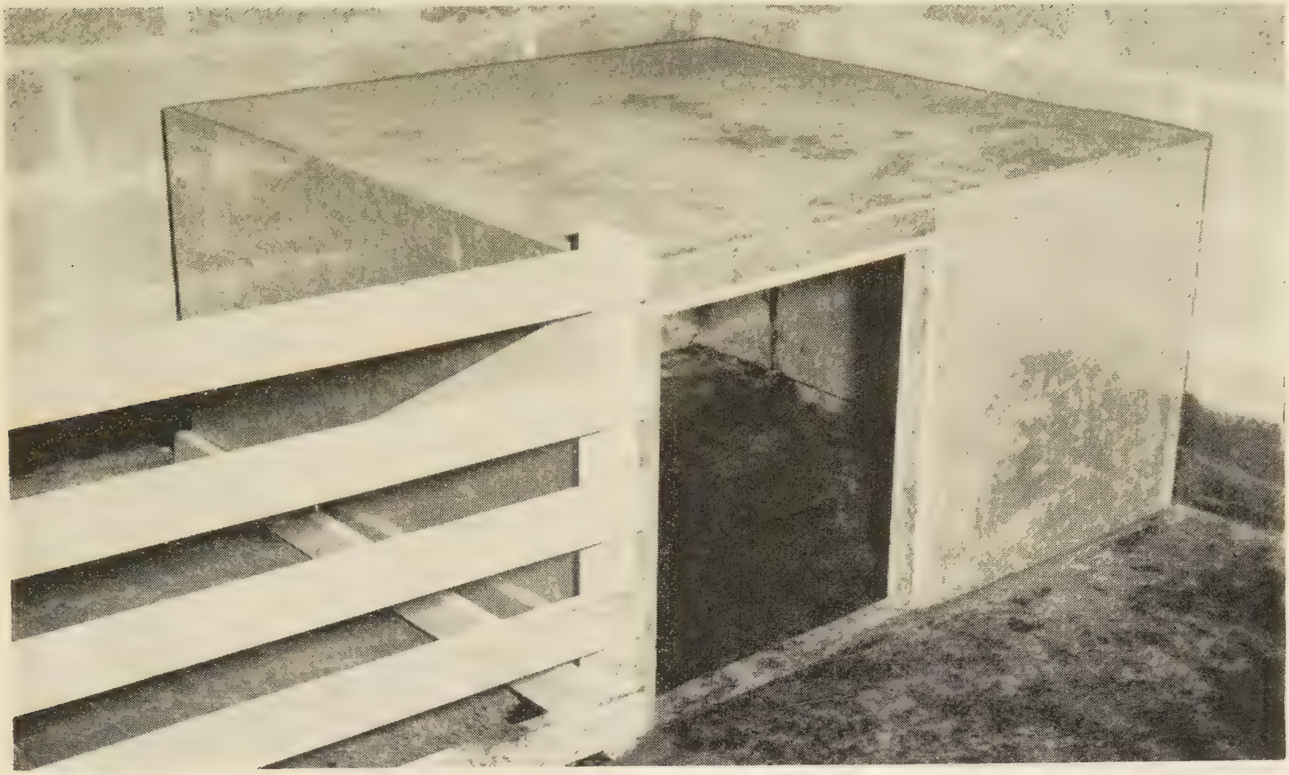


A weaner coop to enable weaners to keep warm on the floor of a fattening house. The same effect could be obtained with adjustable insulating panels, which could be secured to the roof when not required.

HOUSING AND FATTENING EFFICIENCY AS RECORDED ON SOME ENGLISH FARMS

Housing	Meal per lb liveweight gain Winter	 Summer	 Year
	lb	lb	lb
Indoor (11 farms) ..	3.91	4.11	3.99
House with free access to outside run (10 farms)	4.32	4.23	4.25
Open-fronted shed with yard (17 farms) ..	4.52	4.27	4.36

The difference between houses becomes less in summer and except for the indoor piggeries food conversion efficiency is better in summer than in winter. The indoor piggeries failed to give a better conversion figure because four farms were affected by disease.

The risk of disease applies also to New Zealand indoor houses and for that reason particular attention should be given to regular daily cleaning of them and to ensuring that liquid wastes pass quickly to an outside drain.

Indoor whey-feeding fattening houses are proving most successful on several Taranaki farms. However, the modified Harper Adams house, in which pigs are fed and bedded indoors but have free access to an outside yard, is giving very satisfactory results on some Manawatu farms.

It would be valuable if the efficiency of the various types of houses could be measured on a sample of New Zealand farms as was done in England. Conditions differ here in that we feed a mainly liquid diet, the climate is generally warmer and there may be more wind, and labour is valued highly.

Pig producers interested in taking part in a fattening house efficiency trial are invited to write to the Animal Industry Division, the Department of Agriculture, Wellington, giving their name and address, type of fattening house, and the foods normally used for fattening.

Conclusions

Housing designed to reduce deaths and waste of food at the piggery is necessary for efficient production. This is partly achieved by adopting designs and using materials which give more protection to the various classes of pigs from changing weather.

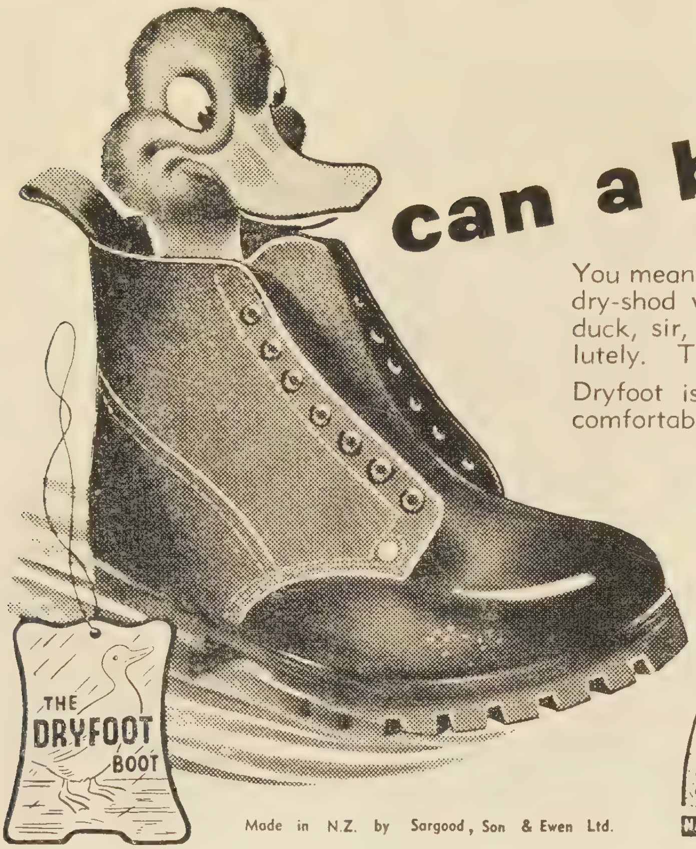
Efficient production probably depends more, however, on a better standard of management, particularly in the feeding of young pigs until they are safely weaned, than is general today. However, new and efficient housing may lead to greater interest in pigs and therefore to the adoption of more profitable methods of husbandry. Housing which permits efficient use of labour is most desirable

50th Jubilee Issue of "Journal", June 1960

THE completion of 50 years of publication of the "Journal" this year is to be marked in the June issue, which will have many special features of historical interest.

The state of farming in 1910, when the "Journal" first appeared, is reviewed, and other articles deal with the development of many aspects of agricultural research and extension and changes in farm management techniques as reported in the "Journal" over the half-century.

Subscribers will receive this special issue in the usual way. A keen demand for extra copies is expected, and it would be appreciated if orders for these could be placed in advance so that printing arrangements can be made. Additional copies at 1s. each (post free) may be ordered from the Publications Section, Department of Agriculture, at Auckland, Wellington, and Christchurch.



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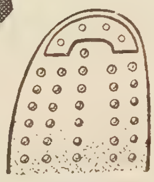
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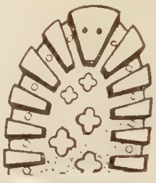
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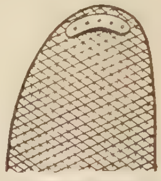
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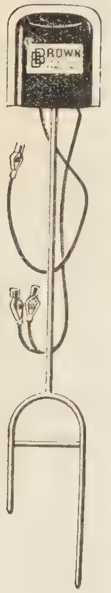

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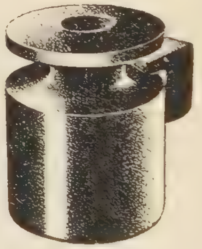

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The Home Garden in April

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

GARDEN work in April consists largely of tidying and harvesting mature and tender crops. Sowing and planting should be limited to a few hardy crops, because as the month passes temperatures continue to fall and the days shorten, and there is nothing to be gained by making more sowings and plantings than are absolutely necessary.

Brussels Sprouts

BRUSSELS sprouts should be harvested regularly by the removal of the sprouts as they reach full size. The bottom sprouts should be gathered first. Leaves should be removed from the base as they turn yellow. Plants in exposed situations may have to be staked, as they usually tend to become top heavy with leaves and sprouts as harvesting progresses.

Various diseases which cause spotting or blotching of the leaves commonly develop on members of the cabbage family in late autumn. If only a few outer leaves are affected, the trouble may be checked by their removal. Where infection is more advanced protective copper oxychloride or other fungicidal sprays may be advisable, though most of the diseases which cause forms of leaf spot increase mainly owing to the cool and moist conditions that occur in late autumn or winter.

Spring Cabbage

If early spring cabbage is wanted, sturdy, well grown plants with good root systems can be set out in most districts in April, preferably toward

Sowing and Planting

Sow

Onions Spinach	In well drained soils that are not too cold
Carrots	A small sowing in districts where winter conditions are not too severe
Peas	In well drained fertile soils in favourable situations toward the end of the month
Broad beans	An early sowing in most districts

Plant

Cabbage Cauliflower Lettuce Silver beet	In most districts

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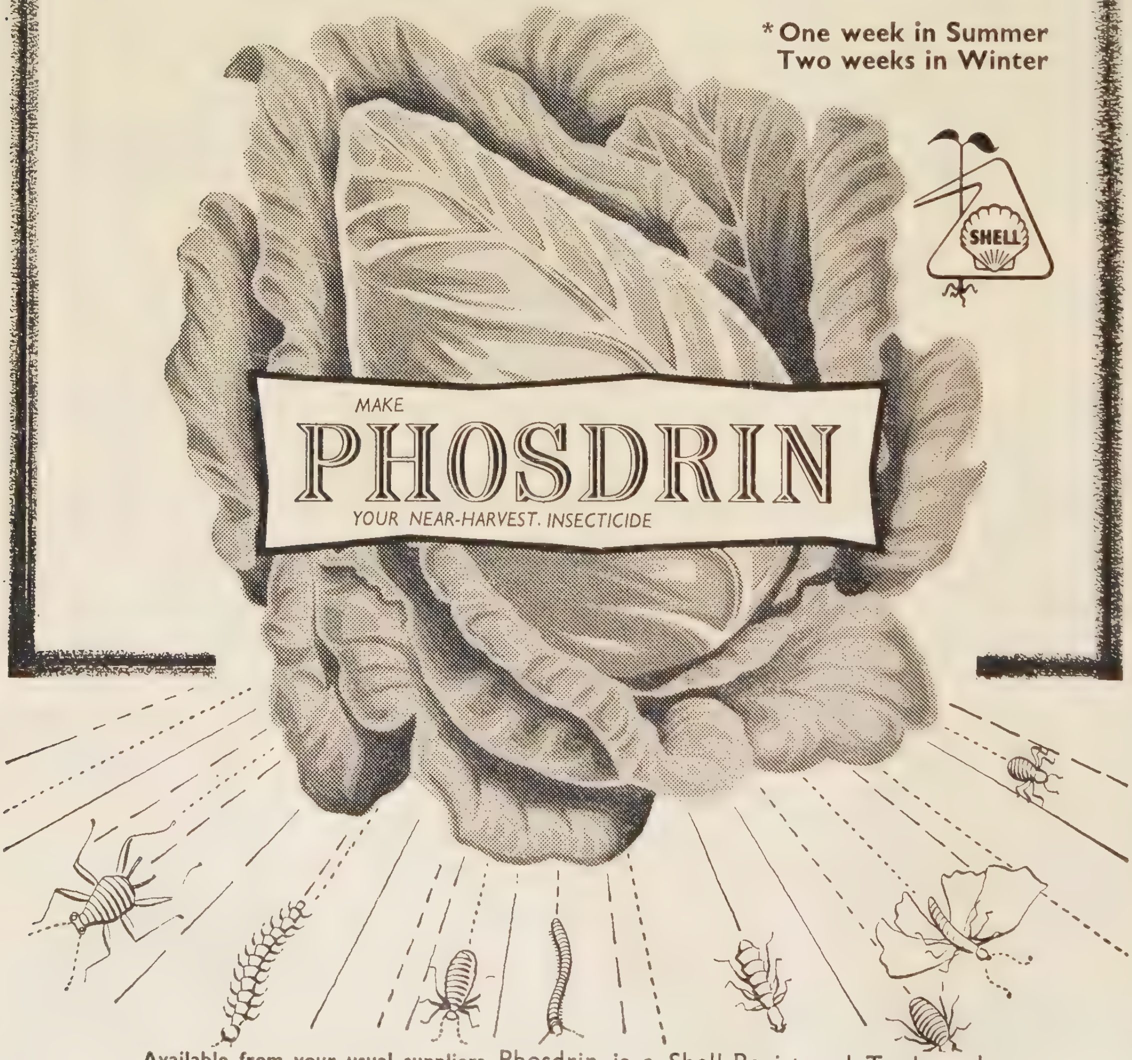

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the end of the month; however, cabbage for spring use can be set out from early autumn until mid winter, or even late winter, depending on the climate and variety. If large plants are set out too early, they may make soft growth and be severely checked or even forced into premature seed development by winter weather.

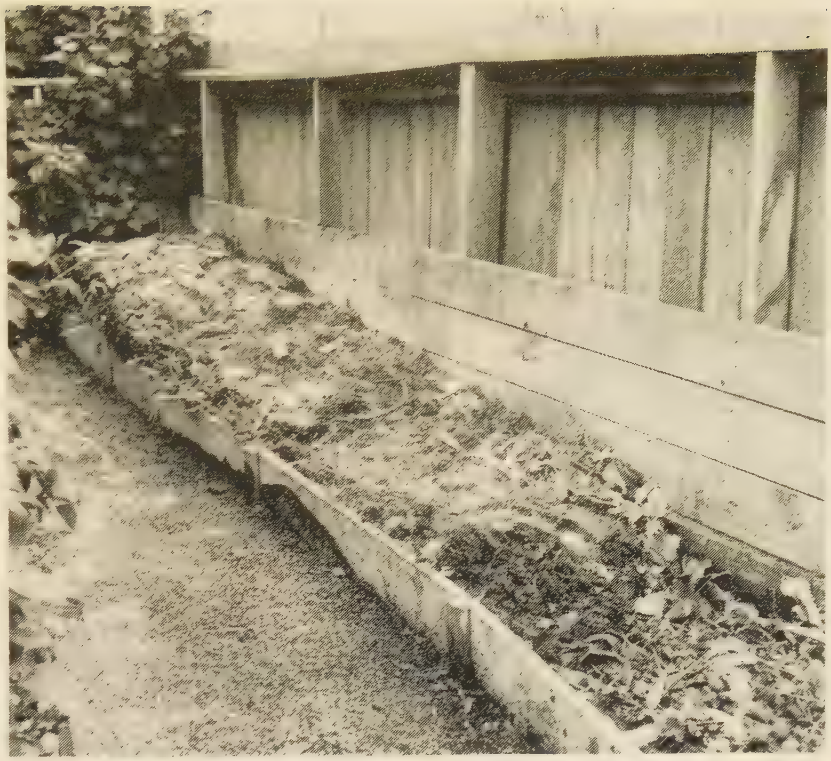
If plants are set out very late, they may be late in maturing. Where winters are severe cabbages planted very late in autumn may not mature earlier and may be less satisfactory than plants set out in late winter or early spring.

Manures

The soil for spring cabbage should preferably be rich in organic matter. In most home garden soils a dressing of organic manure such as farmyard manure, stable manure, or compost or a moderate dressing of fowl manure is likely to give best results. If the soil has not been limed recently and there is a risk of its being acid, a dressing of 3 oz to 4 oz of carbonate of lime per square yard is advisable. Heavier dressings may be necessary on some soils in high-rainfall districts.

Lime is best applied some time before planting. Distribution and incorporation by forking over should be as even as possible.

Though manurial needs of cabbages are high, care should be taken to distribute fertilisers or manures evenly, as young plants may be checked if the roots come in contact with too heavy concentrations of manure, particularly when low temperatures limit growth. Where organic manures are not available a green crop should be dug in. Except where the soil is very rich the organic manure or green crop should be supplemented by a complete fertiliser at about 2 oz to 5 oz per square yard.



A tidy compost heap with vegetable refuse in different stages of decay.

Potatoes can be dug as soon as the tops begin to fail.

In addition side dressings of nitrogenous fertilisers such as nitrate of soda or sulphate of ammonia are often advisable, particularly where organic matter applied to the soil is strawy rather than sappy and well rotted and when quick, forced growth is required (as when temperatures rise in early spring.)

Varieties

There are many good varieties of pointed or spring-type cabbage, but Flower of Spring is probably the best for the greatest range of conditions. Triumph has also given good results in many districts.

Spring Cauliflowers

Cauliflowers and cabbages have similar needs, but cauliflowers are more sensitive to adverse conditions. If checked, they are likely to button (form only miniature heads). Frost damages the curds and may permit the entry of soft-rot organisms. Cauliflowers should therefore be planted out only in districts or situations where winters are not very severe. In unfavourable situations planting is often deferred until late July, August, or even September.

Hardy varieties of cauliflower suitable for planting now include All Seasons (All Year Round), Walcheren, and Early London. Plants are obtainable from most seedsmen.

Onion Harvesting

Harvesting and curing of onions for long keeping should be completed as soon as possible as advised in last month's notes. The weather after April in most districts becomes progressively less favourable for drying and curing the bulbs and only sound, well formed bulbs which have been properly cured should go into long storage; others should be put aside for immediate use.

Small quantities can be strung or stored in open-mesh bags in a cool, ventilated shed or cellar, but because of the injury which often results when there is a heavy weight of onions in a bag it is advisable when storing considerable quantities of onions to use specially made slatted storage crates or to store them on slatted shelves.

Onions should not be exposed to direct sunlight during storage, as it may promote early growth. If it is necessary to store them outside, a dry, sunless position with good draught is desirable. The onions should be protected from rain and preferably placed on a structure far enough above ground to enable air to circulate under them.

The autumn sowing of onions for spring use was discussed in last month's "Journal".

Peas

Though garden peas are hardy and yields are usually higher and the quality is better when the crop matures under comparatively cool conditions, heavy frost is likely to affect the setting of the flowers; frost after a mild period during which soft growth has developed may damage the haulms.

In districts where winter conditions are severe autumn sowing should be done sufficiently early to enable the young plants to become established, but not so early that they make soft growth. Losses from autumn sowing may be serious in severe weather, but in well drained soils in districts where winters are not hard autumn sowing is usually satisfactory.

In many districts, however, autumn-sown crops mature little ahead of crops sown in favourable conditions in spring. For autumn and spring sowings seed should be dressed with a suitable seed protectant such as captan, chloranil, or thiram. The peas should be shaken for several minutes in a tin containing enough of the chemical to coat the seed. Afterward excess should be removed by tapping the tin sharply so that the powder falls to the bottom.

Pea seeds germinate and the plants make vigorous growth at temperatures considerably lower than those suitable for many other vegetables, though not below 40 degrees F.

Sowing

Seed should be sown 1 to 2 in. apart in V-shaped or broad, flat drills, which can be drawn out with the hoe 18 to 36 in. apart according to variety. Drills should be 2 to 3 in. deep, except where conditions are hot and dry, when they should be considerably deeper so that, though the seed should not be covered with more than 1½ to 2 in. of soil, the roots will be well down in the cooler and moister levels.

The seedbed should be thoroughly cultivated, as a fine, well prepared seedbed has an important influence on the promotion of even, full germination and uniform maturity at harvest.

Protection of newly emerged peas against birds is essential in some districts, though birds are troublesome mainly in early spring, when food is short. Pea guards made of wire netting are effective if the ends are blocked, but they should be moved before the peas become entangled in the wire. Cotton stretched over the shoots is also effective if a number of strands, which may be criss-crossed or placed in parallel lines, are used.

Manuring

Peas, though they add some nitrogen to the soil and improve the physical nature of most soils, are an exhausting crop, because they have high demands for plant foods. For this reason and because the period between sowing and harvesting of most varieties is comparatively short, the soil should be well cultivated to enable the roots to spread freely and gather rapidly the nutrients needed by the plants.

Crop failures are often due to poor drainage and sometimes to inadequate liming, though liming should not be too heavy, as a neutral or slightly acid soil suits most pea crops. An annual dressing of 3 to 4 oz of lime per square yard is usually satisfactory, though heavier dressings may be needed in high-rainfall districts.

On soils of fairly high fertility, such as virgin soils or those that have been heavily dressed with organic manure for a previous crop, fertiliser applications need not be heavy. A dressing of superphosphate applied at about 1 to 2 oz per square yard may be sufficient, but on most well worked garden soils a complete fertiliser (such as a mixture containing by weight 2 parts of sulphate of ammonia, 6 parts of superphosphate, and 1 part of sulphate or muriate of potash) at 1 to 3 oz per square yard gives good results.

Peas are highly sensitive to fertiliser injury and care should be taken that the manure does not come in contact with the seed.

Varieties

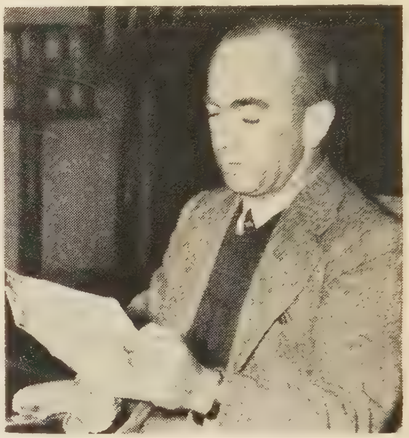
Popular dwarf varieties of peas for autumn sowing for early spring cropping include William Massey, Little Marvel, and Greenfeast. The last-named variety is preferred for autumn sowings in areas subject to frost.

◆

Sudden Death of Superintendent of Flock House

THE death occurred suddenly in January of Mr W. L. Harbord, Superintendent of the Department of Agriculture's Flock House Farm of Instruction at Bulls. He was aged 46.

Mr Harbord began his career in the Department as an Assistant Meat Inspector in Invercargill in 1936. Before that he had five years of practical farming experience in Southland and he held a Diploma in Agriculture from Canterbury Agricultural College.



Mr Harbord.

He became an Assistant Fields Instructor at Invercargill in 1938 and was in charge of the instructional staff in the district when he resigned to go into business in 1949.

Mr Harbord rejoined the Department in 1951 as a Fields Instructor at Flock House and was promoted to Superintendent in 1958.

Mr Harbord was particularly well known in Southland and was highly regarded there. At Flock House he took a close interest in the trainees, not only from an instructional point of view but also in their general welfare and recreation.

◆

British 1960 Dairy Show

AN invitation to New Zealand farmers with dairying interest to attend the 74th annual Dairy Show, to be held at Olympia, London, from 25 to 28 October, has been extended by the British Dairy Farmers' Association. Those wishing to attend are asked to advise the secretary, 17 Devonshire Street, London, W1, of their intention to do so and they will be sent an illustrated folder giving full details.

◆

Seasonal Work for the Domestic Beekeeper

Autumn Work in the Apiary

By D. A. BRISCOE,

Apiary Instructor, Department of Agriculture, Tauranga

WITH surplus honey removed from hives and extracting and packing completed, beekeepers should now turn their attention to the preparation of their hives for wintering and to cleaning up round the apiary. Good autumn management is essential to successful wintering and largely determines the measure of success in the following season.

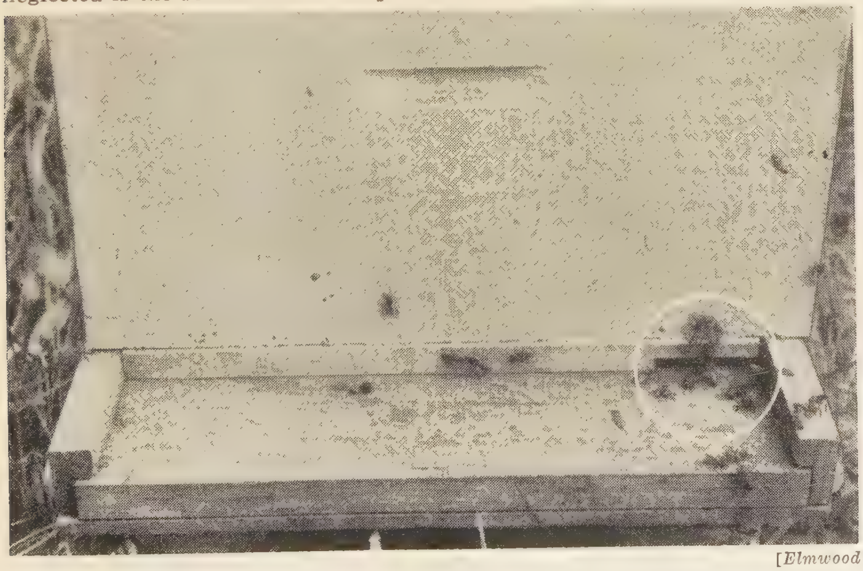
AT the close of a season robber bees can become a serious menace in the apiary. Robbing, which is easily started, is difficult to control once it has developed. However, when precautions are taken to avoid opening hives unnecessarily and to prevent bees from gaining access to honey in the honey house or to any exposed honey within the apiary robbing will be greatly reduced.

Once a hive is opened it is essential to complete the necessary work as quickly as possible. If robber bees are observed alighting on exposed combs or entering the hive, the hive should be closed immediately. Hive entrances can be reduced in size with wooden blocks. With hive entrances contracted to a small opening guard bees are better able to defend the hive against robber bees and any trouble from this cause is not so liable to spread to other hives in the apiary.

Removal of Surplus Supers

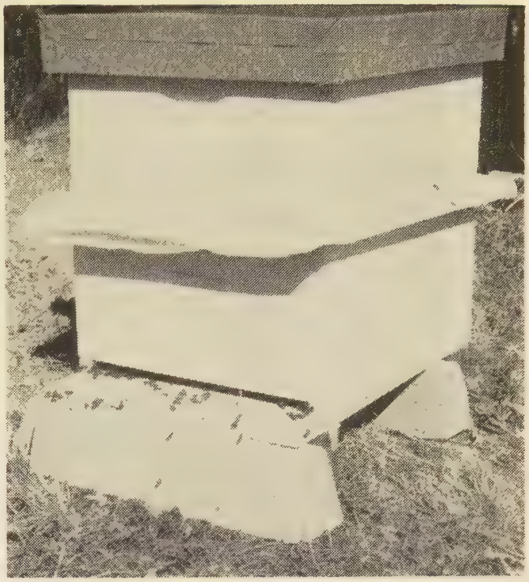
Autumn work which should not be neglected is the removal of all surplus supers. Reducing each hive to two full-depth supers enables bees to cluster and keep warm better in winter. Combs of honey should be stored in the upper super and the brood should be placed in the lower one, with combs containing both honey and pollen alongside the broodnest.

Losses from starvation or from shortage of stores can be very costly to the beekeeper. Normal strong colonies will require not less than 50 lb to 60 lb of honey to winter successfully and to provide sufficient early food for brood rearing in spring. This total of honey can be estimated on the basis that a fully sealed comb contains 5 lb. In addition there must be a reserve of pollen—at least the equivalent of a full comb.



[Elmwood

Hive entrances should be contracted in winter to about 3 in. by ¼ in. A strip of wood as shown is suitable for this purpose.



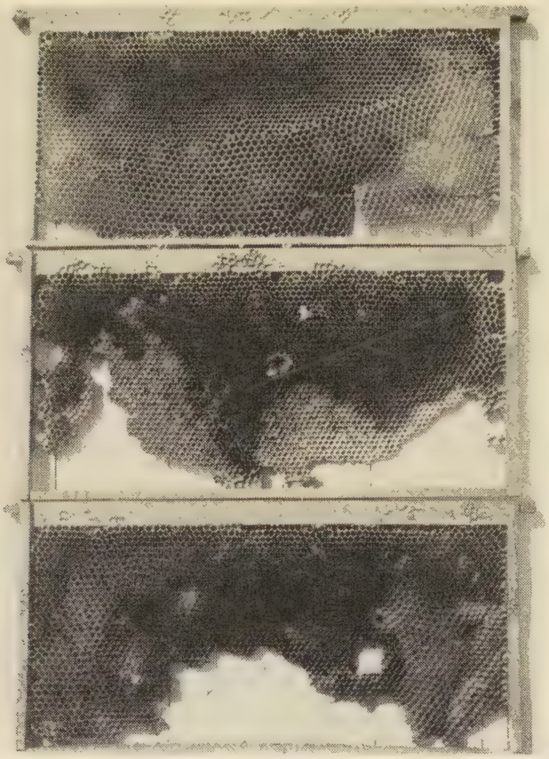
Method of uniting weak colonies with newspaper. When the paper is gnawed through, the bees in both colonies are prepared to work together as one unit.

Damaged combs and combs which contain large patches of drone cells are detrimental to the welfare of a colony when brood rearing begins in spring. Beekeepers should therefore make certain that the brood chambers contain only good combs of worker cells before closing the hives down for winter. Inferior combs which still contain either honey or a little brood may be placed in a super above the hive mat. A corner of the hive mat is turned back to give the bees access to them, and when empty these combs are removed and placed under cover for rendering down later.

Condition of Queen

The condition of the queen in every hive should be noted. The ideal queen is one which continues a high rate of egg production into autumn to provide a large population of young bees for winter. The greater the force of young bees is in late autumn the better will the colony be able to survive the rigours of winter and rear brood in early spring.

Colonies found to be queenless or weak in bees should be united to other under-strength hives. To attempt to save such hives as separate units at this time of the year usually results



[*Rendells*

Inferior and damaged combs that should be removed from the hive and set aside for rendering into beeswax. The cells in the lower half of the top comb are drone cells.

in the bees dying out in the winter or the colony not building up sufficiently in the following season to gather a worthwhile crop of honey.

A simple method for uniting two colonies into a single unit is by the use of newspaper. If the colonies to be united each contain a queen, the less valuable queen is killed. The colony in which the queen is retained is placed above the colony made queenless over a sheet of newspaper. Care must be taken to ensure that the bees in the top colony have no exit until they have eaten their way through the sheet of newspaper into the colony below. In this manner the two colonies will amalgamate amicably and settle down as a strong single unit.

Collection of Beeswax

Beeswax is a valuable by-product of beekeeping. Beside its use by beekeepers for conversion into comb foundation, beeswax is extensively used by manufacturing industries for a wide range of commodities. The domestic beekeeper has a good source of beeswax from cappings, burr combs, and from frame and hive scrapings. Beeswax from these sources should not be discarded or left about in the apiary, as, in addition to the value of the wax itself, it can provide a breeding ground for wax moths, which may cause serious losses. It is also a cause of serious robbing in the apiary and a means for the rapid spread of bee diseases. All old combs and pieces of wax should be saved and allowed to accumulate until enough is available to warrant melting down.

Cappings wax is best dealt with separately. As soon as possible after the honey is extracted the cappings should be placed in a wire strainer trough so that the honey can be drained from them. The cappings should be turned over periodically, as they tend to pack down and trap the honey.

When drained of all free honey the cappings are ready to be melted. A simple method is to bring about 2 in. of water to the boil in a preserving pan and then to add the wax cappings slowly. The pan must not be overfilled and care must be taken to maintain an even simmering heat, as otherwise the beeswax will boil over. When the cappings have been thoroughly melted the wax can be left in the pan to cool, or it may be poured from the pan into moulds and allowed to harden. Dirt and foreign matter will accumulate on the bottom of the wax cakes. This can be scraped or cut off when the beeswax is removed from the moulds.

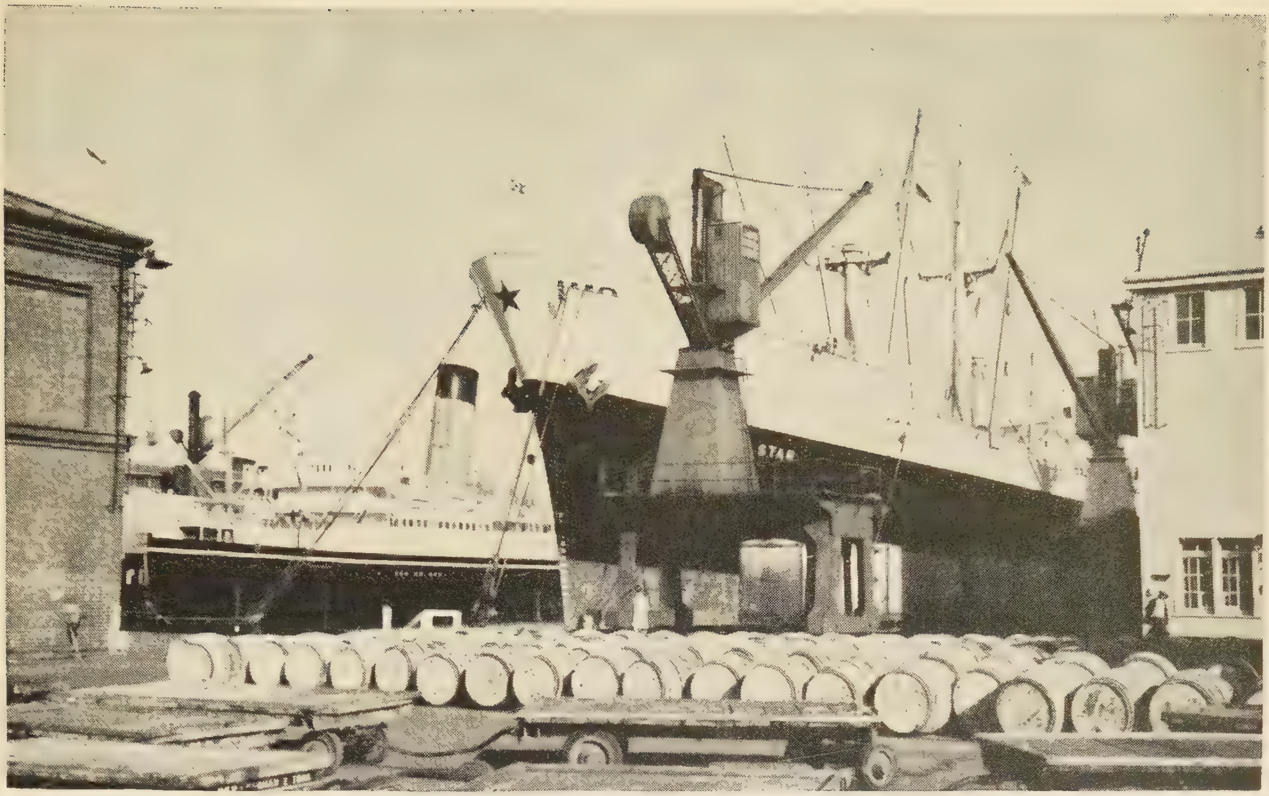
The same procedure can be adopted to render old or damaged combs. However, where a quantity of such material has to be dealt with the use of a copper boiler is recommended. With this a cleaner wax can be obtained if the comb material is rendered within a clean sugar bag. After the combs have been cut out of the frames the combs are broken into small pieces and placed loosely in the bag and the neck of the bag tied. The bag is then submerged in boiling water in the copper. The bag should be pressed frequently on to the bottom of the copper with a suitable piece of wood. This treatment ensures that hot water is constantly passing through the mass, thus melting the wax and allowing it to escape through the bag and accumulate on the surface of the water.

The liquid wax can either be skimmed off and poured into moulds or left in the copper to cool. Slum gum which accumulates on the bottom of the wax should be scraped off. A cleaner product will result if the wax cakes are again melted in clean boiling water and re-poured into the moulds.

◆

Meteorological Records for January

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in Inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	67.0	+ 2.1	93.7	45.9	1.06	5	— 3.44	0.51	24	259
Auckland	160	67.6	+ 1.2	83.0	53.4	0.51	7	— 2.67	0.23	24	236
Tauranga	12	67.1	+ 2.5	89.0	39.0	2.31	7	— 1.43	1.53	6	236
Ruakura	131	64.1	+ 1.0	81.0	41.7	2.41	8	— 1.07	1.11	3	224
Whakarewarewa ..	1,006	64.2	+ 1.6	90.3	37.3	2.93	9	— 1.58	1.10	3	203
Gisborne	14	65.8	+ 1.0	96.1	43.2	2.82	7	+ 0.28	1.01	6	253
New Plymouth ..	160	64.0	+ 1.8	78.2	46.0	2.20	5	— 2.27	1.31	24	195
Karioi	2,125	58.5	+ 1.5	78.1	32.8	2.54	11	— 1.14	0.60	25	—
Napier	5	67.5	+ 2.0	88.0	46.2	2.12	7	— 0.49	1.60	6	230
Wanganui	72	64.7	+ 1.2	81.9	42.6	1.24	6	— 1.54	0.70	24	216
Palmerston North ..	110	64.4	+ 2.0	80.0	38.0	1.22	7	— 1.98	0.72	24	161
Waingawa	340	64.0	+ 1.6	87.7	35.0	1.29	12	— 1.11	0.36	24	204
Wellington	415	62.1	+ 1.1	75.4	44.7	1.41	10	— 1.67	0.42	7	210
Nelson airfield ..	5	66.1	+ 4.5	86.1	46.8	1.19	8	— 1.65	0.53	24	279
Blenheim	12	65.1	+ 2.5	94.7	41.2	0.55	4	— 1.44	0.29	24	246
Hokitika	15	59.6	+ 1.5	71.3	42.4	7.17	16	— 2.55	1.50	2	198
Hanmer	1,270	61.8	+ 2.1	91.0	37.8	2.47	9	— 1.06	0.86	6	199
Christchurch ..	22	63.2	+ 1.8	97.0	45.3	1.59	10	— 0.64	0.56	31	185
Ashburton	323	64.6	+ 3.6	96.0	41.4	0.61	8	— 2.02	0.22	3	188
Timaru	56	63.2	+ 2.6	94.3	43.6	0.96	6	— 1.41	0.36	3	188
Alexandra	520	65.4	+ 3.7	91.0	43.4	1.26	12	— 0.58	0.38	28	236
Taieri	80	60.2	+ 2.4	87.8	37.8	0.91	12	— 1.47	0.22	23,24	180
Invercargill airfield ..	0	57.8	+ 1.6	79.1	39.4	4.14	18	+ 0.41	1.22	1	184
Chatham Islands ..	150	56.2	— 1.1	70.6	33.3	2.99	11	+ 0.21	1.12	24	—



International Action in Trade in Agricultural Products

By J. V. WHITE,
Rural Economist, Department of Agriculture, Wellington

NATURAL hazards—unseasonable weather, floods, droughts, diseases, and pests—beset primary producers the world over, but their welfare has often been menaced as much by disastrously low prices or even inability to find a market at all. So far perhaps not a great deal of success has come from well intentioned efforts to develop some regulation of international trade in agricultural products, but (at least in recent years) a great deal of thought and effort have been directed toward trade problems. As a major exporter of dairy products, meat, and wool New Zealand is vitally concerned. Some of the complex issues in resolving problems in international trade in agricultural products and the development of agencies to deal with these problems are discussed in this article.

THE position of our major products in world markets has been broadly covered in previous articles. From these analyses it is clear that New Zealand must expand its value of exports more or less pro rata with increasing population and that we have the physical potential to achieve the necessary rate of expansion as far as one can reasonably expect to look into the future. It is also clear that there are two major factors limiting market expansion:

1. Our products are expensive in terms of the incomes of perhaps three-quarters of the world's population and it may well be many years before the demand of all but a small percentage of these people becomes effective.

2. Artificial restrictions on or interference with international trade by quotas and embargoes and by the disposal of surplus products at uneconomic prices have completely disrupted normal commercial trade.

The first is of considerable importance and the solution of even a few of the multitude of problems involved would be of inestimable value to our future trade. Let there be no mistake, however, as to both the number and complexity of the problems. In only a few of the countries where there are large populations needing food is the rate of economic development exceeding the rate of population growth by a sufficiently wide margin to ensure

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any real improvement in the financial position of the individual. Again, most of these countries have adopted welfare state principles which means progressive and probably heavy taxation on that relatively small, better-paid section of the community which can be regarded as potential consumers of meat and dairy produce.

International action to promote quicker development is increasing rapidly. There is even an element of competition between groups representing different political viewpoints to provide assistance. One difficulty is the coordination of the various phases of economic development, for example, the provision of a particular service or piece of equipment before people can use that service or are sufficiently well off or enlightened to buy the product. The major problem, however, is still one of increasing real incomes, which simply means the provision of more goods and services per head of population.

Fundamentally important as this problem is, however, its relation to present marketing problems is rather indirect and any effects are essentially long term.

In international trade in agricultural products the problems, being essentially man made, should be easier to solve. Further, they are in a sense more basic problems, because the philosophy of agricultural protectionism is becoming very strongly entrenched in the economies of industrial countries. This is largely because in a highly industrialised country the burden of supporting agriculture at uneconomic levels is relatively small and because the farm vote, though perhaps not relatively big, is marginally important where two major parties bid for power.

In fairness it should be added that in some countries there is a sincere belief in the need to increase farm incomes to bring them into line with those of the rest of the community and to maintain a high level of domestic production of food for strategic reasons. Some of these aims are based on faulty premises, but the general philosophy of improving the lot of the agriculturist is to be applauded. The all-important thing is that the methods adopted should result in a more balanced expansion of agriculture without prejudicing the economic principle of comparative advantage; that is, the end result should be optimum utilisation of scarce resources.

Early Developments

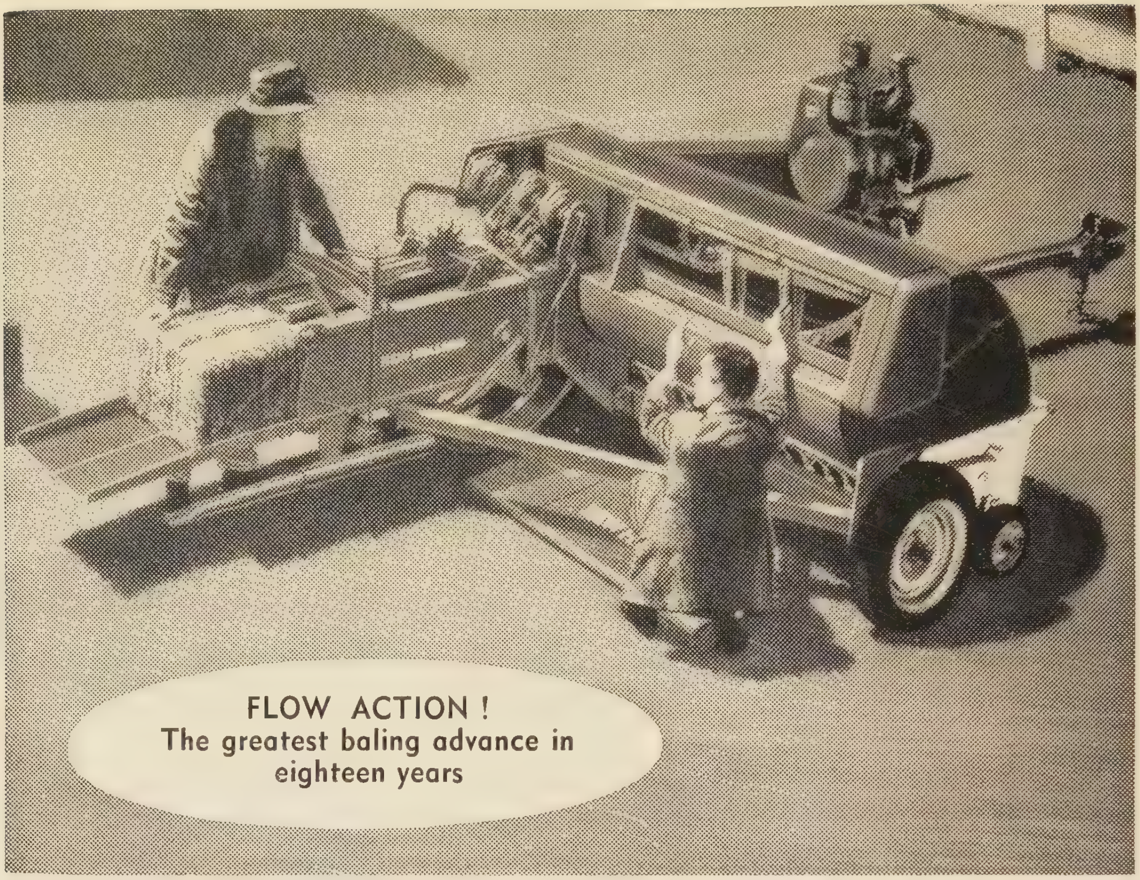
Protection of industry is not new and by no means confined to agriculture. Protection, mainly by a tariff, was the established method of fostering infant industry before the war, though the principle of comparative advantage was a firmly established economic doctrine in the late 18th and early 19th centuries.

The protection of agricultural industries from foreign competition was at first confined to grains, for the very good reason that these were virtually the only foodstuffs that could be transported long distances until refrigeration and faster transport were developed. It is not without significance that agricultural products which are essentially raw materials are generally admitted without serious tariff or quota restrictions even when, as with wool, they may be produced in the importing country. This is because they are necessary for low-cost manufacture.

Again, there was strong pressure in the United Kingdom from manufacturers for cheap food imports. Their motives were varied. Cheap food and hence lower wages no doubt played their part, but the main objective was the encouragement of overseas countries as potential markets for British manufactured goods. Thus the United Kingdom after the abandonment of the Corn Laws in 1846 maintained complete freedom of entry for agricultural products until the 20th century. This was the deliberate cheap food policy, which was undoubtedly a major factor in making the United Kingdom the lowest cost producer of manufactured goods almost until the First World War. In the 20th century, however, circumstances changed.

Changed Trading Patterns

Advances in science changed the trading patterns for agricultural products. The Dominions became of new significance not only as producers of meat and dairy produce but as important markets for manufactured goods from the United Kingdom.



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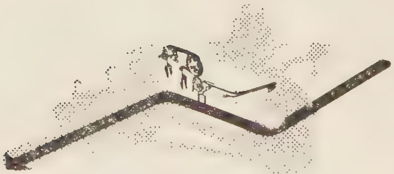

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This mutual relationship was to some extent formalised in the Ottawa Agreement of 1932, under which tariff and quota preferences were extended to certain goods entering the United Kingdom from Commonwealth countries, while these countries in turn extended certain margins of preference to goods from the United Kingdom. This could not be termed an international agreement, as it was confined to Commonwealth countries, and the extent to which agricultural producers in these countries benefited was at the expense of producers elsewhere. A number of similar groupings of countries was initiated in succeeding years.

Depression Years

The effect of these agreements of the 1930s on the agricultural producer was, however, fairly limited. Limited tariff preferences may have some value in normal times, but the impact of the depression of the 1930s was particularly severe on the farming industries, especially those of exporting countries. This was the period when the catch cry "Poverty midst plenty" appeared to have some meaning; when food was burnt or otherwise destroyed, and there was hunger and poverty not only in the underdeveloped countries but in highly industrialised North America and western Europe.

Faced with lower incomes and lower prices for all products, farmers in some countries endeavoured to increase production to build up their net incomes. The increased production caused still greater falls in price. There inevitably developed considerable interest in ways of assisting agriculture by price support, loans, grants, or other means. This was particularly true of the U.S.A., and it was the period when guaranteed prices for butter and cheese were introduced in New Zealand.

Limitations to Support Prices

However, in countries where a large proportion of any particular product is exported the extent to which farm prices can be supported is very limited. Under these circumstances it was understandable that many countries should think of international action as the logical means of providing stability for their farming industries, or at least for some products. It was natural, too, that the first attempts at international action should be more in the nature of cartels of exporters than true international commodity agreements; that is, groups of exporting countries aiming at restricting supply and maintaining higher prices rather than increasing consumption.

It was also natural that the first attempts should be made in the difficult period of the early 1930s and that they should be in respect of sugar and wheat. There is substantial international trade in sugar even today, in spite of extensive development of sugar beet growing in temperate countries, but it was much greater in the 1930s. Wheat has always been an important agricultural export and it is generally a major farm crop of most temperate countries. Before the war the price of wheat was a fairly good indicator of general economic conditions.

The first "international" agreement was with sugar and was known as the Chadbourne Plan. It was signed in May 1931. Under this agreement two great cane sugar exporters, Cuba and Java, and five sugar beet producers, Germany, Czechoslovakia, Poland, Hungary, and Belgium, limited their exports. This was clearly a cartel rather than an international agreement, but was more or less forced on the major producers by the development of preference areas (of which the Ottawa Agreement was only one) and the encouragement of sugar beet growing in some of the major importing countries.

The intensification of depression conditions resulted in a reduced demand for sugar and the Chadbourne Plan virtually failed, but under the leadership of the British Government a new agreement was initiated with much wider representation. In a modified form this agreement still operates as will be explained in a later article.

The story of international cooperation in wheat marketing is somewhat similar. Because of increased production, restraints on trade, and the effects of the world depression, wheat prices reached disastrously low levels in the early 1930s.

First Wheat Agreement

The first International Wheat Agreement was signed in London in 1933 by 21 countries, including the principal importers and exporters. The agreement provided for export quotas, acreage reductions, the promotion of consumption, and other measures in an effort to bolster prices.

At that stage international agreement took the form of efforts to reduce production, but the negotiators worked in an entirely different environment. There were many hungry people in the world, but the more advanced countries did not at that time regard the solution of problems of chronic poverty as their responsibility, though they were always prepared to undertake relief programmes if famines occurred through war or natural disasters. At that time what is now termed the "population explosion", essentially the result of applied medical science resulting in a much lower death rate, had scarcely begun.

Experience both internationally and by individual countries has shown that endeavours to restrict production either voluntarily or by legislative enactment are extremely difficult to make effective. This proved to be so with the 1933 Wheat Agreement, which became virtually inoperative by 1935. It collapsed finally over the signatories' inability to reach agreement on Argentina's quota for 1934-35, this country having had a particularly high yield that season.

From 1935 until the Second World War broke out there were no further attempts at international action in trade in agricultural products. Economic nationalism as one manifestation of nationalistic philosophy generally, was reflected in a great extension of state activity in trade in agricultural products, both domestic and external. The world has seldom been further from the ideal of international cooperation than it was between 1935 and 1939.

The few rather spasmodic attempts at international action in trade in agricultural products had laid emphasis on the problem of exporters and as a result tended to be restrictive. The circumstances of that time made the concept of an expansion of world trade, particularly in agricultural products, idealistic if not Utopian. It must be remembered, too, that it was a period of intense nationalism during which protectionism was applied extensively in accordance with the curious philosophy that exports are "good" but imports are "bad" and the chief trade aim should be to build up large "favourable balances".

Effects of World War; FAO Formed

A natural reaction to the horrors of war is a strong determination to take measures necessary for people to live together in peace and harmony. The achievement of this aim involves international cooperation to an increasing degree, and the tremendous development of air transport after the Second World War has enabled international negotiations to be carried out much more effectively and expeditiously than they formerly were.

Though the United Nations was established for the prime purpose of preventing war, it was appreciated, even before the Atlantic Charter was signed, that effective action would have to include measures to promote economic development. Hence the Food and Agriculture Organization was formed in 1945 as a result of the Hot Springs Conference two years earlier.

Many other international or semi-international organisations are connected in some way with problems of trade in agricultural products or with the problems of some particular product, but FAO is the only body concerned with problems of world agriculture as a whole, including both technical and marketing problems.

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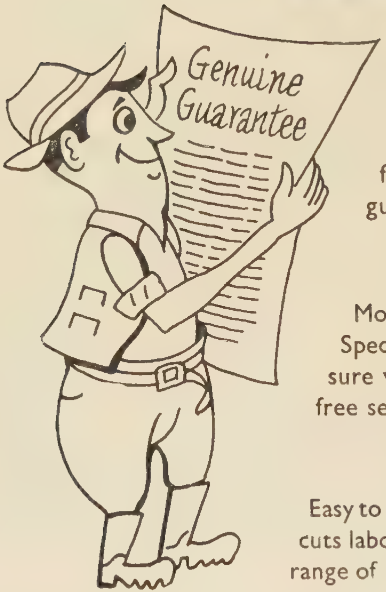

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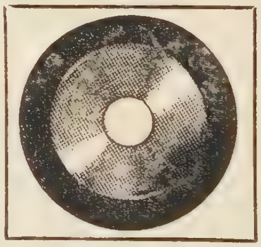

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Agricultural products which are essentially raw materials, such as wool, are not usually subject to serious tariff or quota restrictions because countries need them for low-cost manufacture.

The preamble to the constitution of FAO reads as follows:

> The Nations accepting this Constitution, being determined to promote the common welfare by furthering separate and collective action on their part for the purposes of:
>
> raising levels of nutrition and standards of living of the peoples under their respective jurisdictions;
>
> securing improvements in the efficiency of the production and distribution of all food and agricultural products;
>
> bettering the condition of rural populations;
>
> and thus contributing toward an expanding world economy;
>
> hereby establish the Food and Agriculture Organization of the United Nations . . . through which the Members will report to one another on the measures taken and the progress achieved in the fields of action set forth above.

FAO was established to raise levels of nutrition, particularly in what have now become known as under-developed countries, and as these include more than half the world's population, it is natural that the major portion of FAO's effort should be along these lines. To the extent that success is achieved there will undoubtedly be a marked effect on the demand for foodstuffs, particularly the higher-priced protective foods which the peoples of these countries so urgently need. In that respect this work is of increasing importance to New Zealand. It is, however, long term and must be accompanied by a general improvement in the rate of economic development.

In addition FAO has devoted considerable time and effort to distribution problems; it is with this phase of its work that this article is mainly concerned.

One of the fears of the first director-general of FAO, the eminent nutritionist Sir John Boyd Orr, was that in the immediate post-war years there might occur a repetition of the experiences of the 1930s, when farmers suffered because they produced too much (that is, because they were too efficient) and Governments stepped in and paid farmers not to produce at a time when many people in the world were hungry. He felt that farmers might be reluctant to produce to the maximum consistent with their resources and knowledge.

In anticipation of this he endeavoured to have established a World Food Board with wide powers to acquire, hold, and distribute any surplus stocks of food which might develop. Countries were unwilling to surrender economic sovereignty to this extent and Sir John's scheme was not accepted. (A similar fate befell a comparable scheme propounded in 1949 for an International Commodity Clearing House as a means of stimulating consumption of surpluses by countries whose consumption rate was being retarded by shortage of hard currency.)

As a result of the discussion, however, it became clear that as surpluses arose FAO had a moral responsibility to ensure their distribution in a manner fair to all affected.

Committee on Commodity Problems

To this end there was established in 1949 the Committee on Commodity Problems (CCP) responsible to the council of FAO. Originally established because of the problems in disposing of surpluses owing to balance-of-payments difficulties, the CCP later expanded its operations to a continuing review of all agricultural commodities, particularly of changes in supply and demand of them.

Nevertheless the central problem at that time was the disposal of surpluses, which by 1953 had reached alarming proportions in the U.S.A. To find ways of reconciling the interests of needy countries on the one hand and exporting countries likely to be adversely affected by indiscriminate disposal of surpluses on the other the CCP set up a special sub-committee known as the Consultative Sub-Committee on Surplus Disposals (CSD), in Washington. This was the obvious site for the committee, as all the countries likely to be affected have suitable representation (trade or agricultural officers) there and North America holds most of the world's surpluses.

New Zealand, through its Commercial counsellor, has taken a prominent part in the work of this committee. Attention has been focused mainly on dairy products, partly because of the difficulties of storing them, compared with grains or fibres, but principally because of the obvious need of many countries for such foods, particularly animal protein foods.

The terms of reference of CSD were as follows:

> (1) The most suitable means of disposing of surpluses, including proposals for setting up consultative machinery through which the disposal of agricultural surpluses can be facilitated.
>
> (2) The principles which should be observed by member nations in order that the

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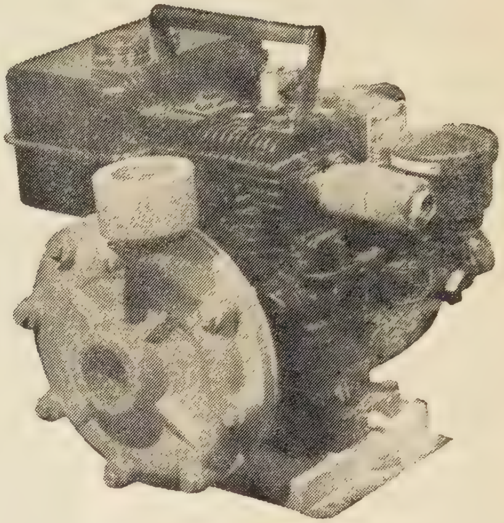

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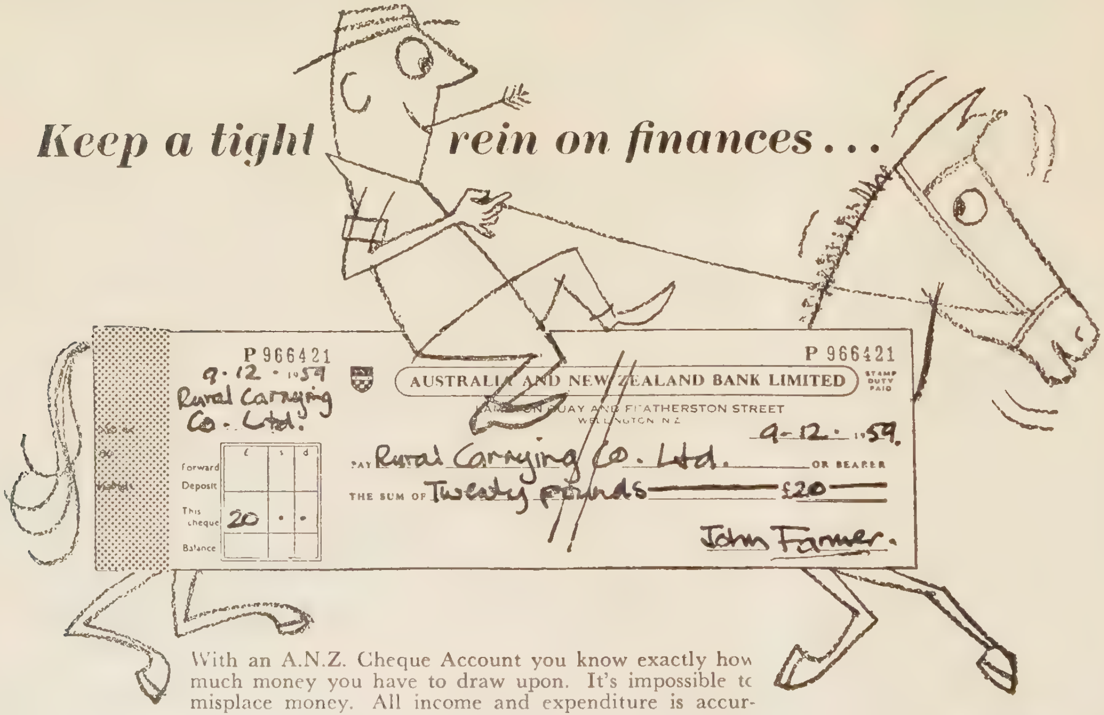

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disposal of surpluses can be made without harmful interference with normal patterns of production and international trade.

The committee cannot be said to have had any marked success with the first. International cooperation was achieved in assistance in the establishment of a milk treatment plant in Calcutta, where high-fat-content buffalo milk was "toned" with imported skim milk powder. New Zealand has donated money, technical assistance, and milk powder at concession prices to help get this plant established.

Further schemes for similar assistance to under-developed countries have been investigated, but there are two fundamental difficulties. Firstly, a large amount of capital is invariably required, which the exporting countries are unable to provide or feel would place an unduly heavy burden on the few countries contributing. Secondly, and more important, these schemes reduce surpluses very little. The potential for increased production of milk powder is considerable and producing countries can soon make up the relatively small amount by which their stocks have been reduced. In New Zealand, for example, available plant could produce over 70,000 tons of powder, but production has only once exceeded 50,000 tons and during the past two years has been under this figure.

Moreover, New Zealand experience with this type of assistance has not been happy. After having given considerable aid to India to establish milk treatment stations (mainly under the Colombo Plan) we have had our market in that country drastically curtailed because India has had to impose severe import restrictions on milk powder owing to acute balance-of-payments difficulties.

The work of the CSD has been much more effective in respect to the second of its terms of reference. Quite early in its proceedings it drew up a set of guiding lines and principles for disposal of surpluses. These were agreed to by some 40 member countries including all those likely to be concerned in a major way either as exporters or as importers.

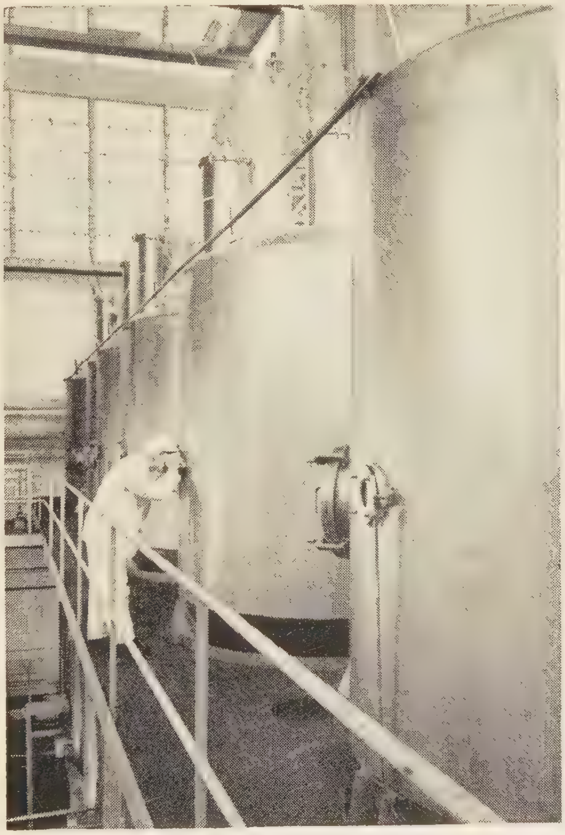
Countries have not always observed the principles to the letter, but their existence and the fact that they can be invoked (either in meetings of the CSD or in unilateral approaches to the offending Government) by countries considering themselves adversely affected, has been a powerful weapon which countries such as New Zealand have found to be of considerable value.

In addition to the CSD, the CCP has at times established study groups for particular commodities where some form of consultative machinery did not exist. The materials include grains (including coarse grains), rice, coconuts and coconut products, cocoa, and olive oil. For olive oil an international commodity agreement has been drawn up and will come into force shortly.

Agricultural Protectionist Philosophies

Farm leaders have over the years looked with some envy at manufacturing firms which are able to adjust production to a considerable extent to demand by reducing output or by diversification. Agriculture is much less flexible, not only because of the multitude of small production units, but because the biological nature of farming makes rapid adjustment difficult and sometimes impossible.

The inherent instability of farm incomes has undoubtedly been a major factor in inspiring the various philosophies of agricultural protectionism which today so seriously bedevil international trade in agricultural products. Where the proportion of the product consumed domestically is high and total farm income represents a relatively small portion of total national income, schemes to protect local agriculture can be implemented without too heavy a financial burden; even when there are rumblings of discontent from the taxpayer he can generally be placated on various grounds of dubious validity but strong emotional appeal such as "the social value of a prosperous agriculture" or "the need to expand domestic food supplies for strategic reasons".



Milk powder manufacture in a Waikato factory. With the plant available New Zealand factories could produce over 70,000 tons a year, but because of marketing difficulties production has never exceeded 50,000 tons.

The philosophy of agricultural protectionism is by no means confined to the wealthier industrial countries. However, the extent to which it can be applied is clearly limited by the degree of economic development of the country and the importance of agriculture to the whole economy.

Because the countries which are protecting their farming industries are advanced technologically, they are achieving higher and higher yields of crops and livestock products. At the same time they are encouraging still higher production by offering prices which bear no relationship to those ruling in the world's free markets for the same commodities. Import quotas and frequently complete embargoes are used to protect these extensive support systems.

These measures unquestionably increase production; in fact so successfully sometimes that production exceeds demand at the high selling prices set by the support system. The result is the surpluses which are of such concern to economic producers such as New Zealand.

Rules for controlling the disposal of these surpluses are valuable, but do not get at the root of the trouble—excessive protection of agriculture and the means by which it is provided. The problem is being attacked simultaneously by FAO and GATT (General Agreement on Tariffs and Trade). The problem was the subject of one of the most important recommendations of the Commonwealth Economic Conference in Montreal in 1958.

A report by a panel of experts (set up as a result of a 1955 FAO Conference decision) gave a comprehensive review of the various systems of price support operating and constructive criticisms of each. However, the report itself was criticised, particularly by under-developed countries, who felt that insufficient attention had been

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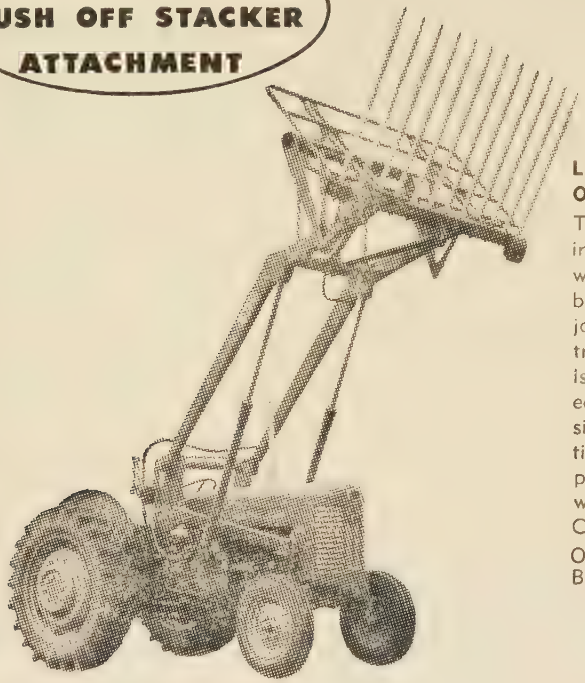

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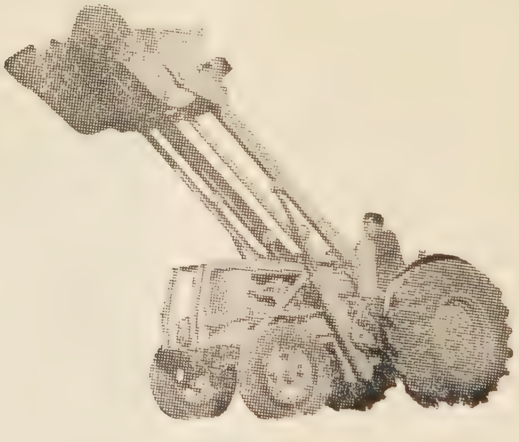

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paid to their problems. Exporting countries considered the report admirable, but that the problem resulting from increasing development of agricultural protectionism was becoming so urgent that a set of guiding principles was needed which would act in some measure as a brake on the wealthier industrial countries which were rapidly developing a sort of "hot-house" agriculture.

Hence a further panel was set up to prepare a report analysing the various agricultural support systems (including types other than purely price support measures), with particular attention to the problems of underdeveloped countries, and to recommend guiding principles designed to minimise the adverse effects of agricultural support policies on international trade. This panel was convened in April 1959 and its report was to be considered at the 1959 session of FAO Conference.

Influence of GATT

Though it is not concerned specifically with agricultural produce, GATT comes within the scope of this discussion. It represents the first major attempt to obtain a reduction in trade barriers by international action.

The general agreement arose out of discussions initiated by the Economic and Social Council of the United Nations in 1946. The object was a charter for the liberalising of world trade. While this charter was being hammered out at Geneva in 1947 the countries concerned at the same time carried on tariff negotiations among themselves and drew up the General Agreement on Tariffs and Trade as a provisional agreement and as a necessary background to an international trade organisation.

The international trade organisation charter, though drawn up finally at Havana in 1948, was never ratified.

On the other hand, GATT has operated for nearly 12 years and has undoubtedly moulded trading conditions. Essentially GATT is a multi-lateral tariff agreement under which countries negotiate tariff concessions with one another.

It is the only international organisation for the discussion and study of international trade problems.

The rules of GATT insist on the elimination as rapidly as possible of discrimination in international trade and frown on the use of import controls to protect industry and on subsidised exports. Ample scope is provided for consultation between contracting parties.

As an important part of the vast, complex framework of international trade, agricultural products come under GATT just as much as industrial products. Unfortunately, however, GATT has not been very effective in assisting agricultural countries. This is because of the intensification of agricultural protectionism and the consequent reluctance of countries to liberalise trade in agricultural products.

In 1955 the U.S.A. asked for a special waiver to permit it to continue imposing import controls on agricultural products. (Under GATT import controls are permitted only when a country faces balance-of-payments difficulties.) This waiver was granted because other industrial countries felt that at some time they might be similarly situated and because refusal to grant the waiver might have destroyed GATT.

Other industrial countries (with the exception of the United Kingdom, which has always maintained virtually an open market for agricultural products) have been able over most of the period to plead balance-of-payments difficulties as the reason for protecting their agriculture. With the improvement in economic conditions in western Europe this justification has been gradually losing its substance; in Western Germany it was lost completely some time ago.

This country has since been subject to some pressure to liberalise its trade in agricultural products. As a result concessions were made on a few items, but strict control still applies to the products in which we are mainly interested. Western Germany was given a special dispensation at the 14th Session of GATT in June 1959 to continue restrictions on trade in agricultural products for the next three years.

Thus GATT has not achieved much in the solution of problems in trade in agricultural products, though it has shown that it is well aware of the problem and is probably the international organisation best equipped to tackle it.

In 1958 GATT set up a panel of four economists to draw up a report on the effects on international trade of agricultural protectionism. The panel chairman was Professor G. Haberler of Harvard University, a world authority on international trade.

The panel's report was a strong indictment of agricultural protectionist measures as they adversely affected international trade. However, the report has not yet been accepted by GATT. Nevertheless, with its strong rules for the conduct of international trade GATT may yet prove to be the strongest international weapon that can be directed against agricultural protectionism.

Not All Commodities Restricted

Some commodities the prices of which fluctuate violently because of changes in supply and demand are not restricted by protection in the main importing countries. Sometimes this is because the product is from a tropical crop which cannot be grown in temperate countries (such as tea, coffee, cocoa, oil seeds, rubber, coconuts, and some fibres).

Though there are support schemes for wool in both North America and the United Kingdom, they are not having any marked effect on world supplies and in any case import policies for fibres are generally liberal because they are required for local industry. This is not so with tobacco and cotton, however, though this does not affect New Zealand trade. Tobacco and cotton are grown and supported extensively in the U.S.A., and there are heavy stock piles of both commodities.

Major Exports Affected

Commodities subject to violent price fluctuations are often of considerable importance to the countries producing them and they may represent the major if not the sole source of export earnings of underdeveloped countries; for example, rubber in Malaya, tea in Ceylon, cocoa in West Africa, and coffee in Latin America.

There is general agreement that such price fluctuations are undesirable in the long run for both producers and consumers. A characteristic of most of these commodities is that supply cannot be changed rapidly in response to fluctuations in demand (many, for example, are tree crops).

To meet the marketing problems with these commodities international commodity agreements have been proposed and in one or two cases implemented, with varying effectiveness. In some instances international study groups have been established, sometimes as the preliminary to an international agreement and in others to assist the major producing and consuming countries to keep the position of a product under constant review.

Though actual production of a commodity may be highly inelastic, it is sometimes possible to adjust one's marketing policy to avoid flooding a particular market or conversely to endeavour to maintain a flow of supplies where shortages appeared likely to develop. To do this requires a continuing flow of statistical and market information and in this respect the study group technique has proved particularly valuable.

The quest for stability in world markets has been continuing spasmodically but fairly consistently since the Second World War. There is general agreement on the need to avoid violent fluctuations in prices, but it is not so easy to put precept into practice. The various attempts to formulate machinery for international action on commodities and commodity agreements themselves will be described in a subsequent article.

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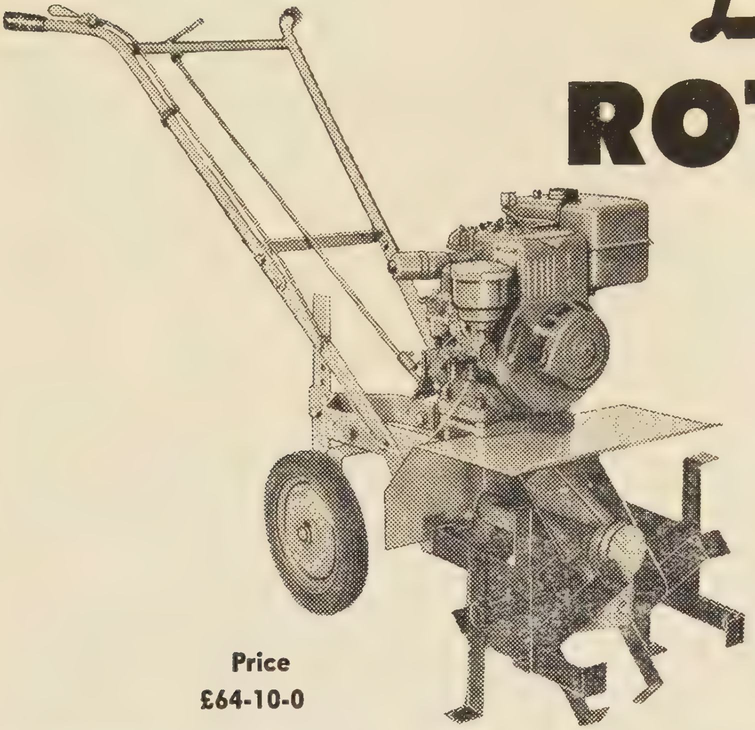

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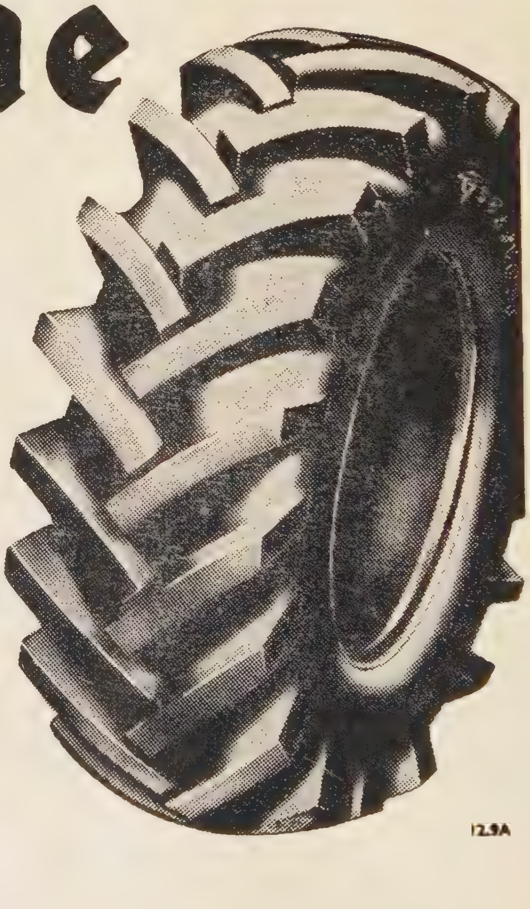

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A Hay Barn for Hill Country

By J. D. CURRIE,
Farm Advisory Officer,
Department of Agriculture,
Hamilton

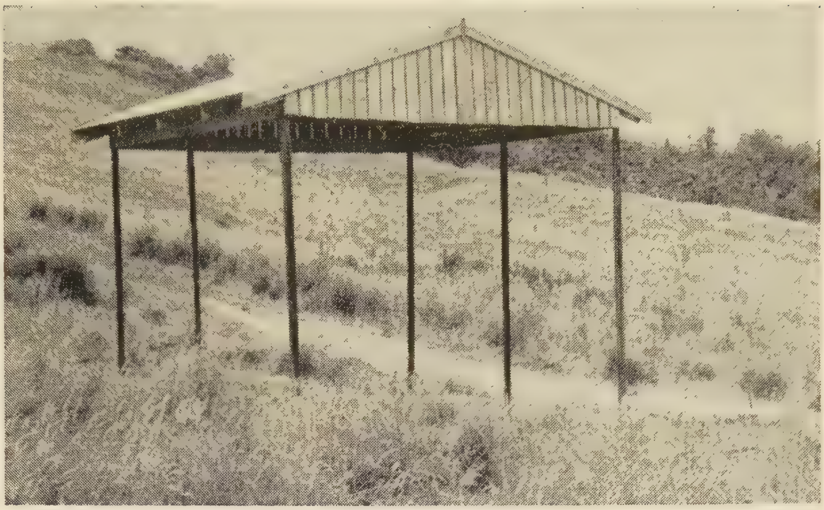
IN hill country improvement the provision of a properly protected supply of good hay at the back of the property enables the breeding herd and the young cattle to be wintered where they are most needed. The feeding of hay provides the best tool for the initial development of dirty faces. The following article discusses the siting, cost, and building of a small, cheap hay barn to provide the above advantages to hill country development.

WITH big cattle becoming uneconomic there has been a heavy demand on the breeding herd, and often on the young cattle, for second growth control. Many hill men, faced with low condition in young cattle as they become embarrassed for feed toward the end of winter, have been quick to realise the benefit of a few bales of hay.

Just as valuable, but not so widely appreciated, is the easy means of pasture improvement provided by the feeding of good hay down the steep, dirty faces common to all hill farms. Cattle lured on to these faces by the hay quickly open up the bracken fern and smaller second growth with their trampling, and their dung and urine concentrations provide a fertile medium for the hay seed. The area thus won can be consolidated the following autumn with topdressing.

Hay is a valuable crop that warrants proper protection; and the hay barn at the back of the property becomes the centre for work away from the homestead, providing shelter for the worker and his equipment and, when properly fenced, a warm spot for the mothering on of lambs or the nursing of sick stock. Sheep yards may logically follow later.

Rapid stock increases have accompanied aerial topdressing and have brought in their train sheep management problems previously unknown to the hill man. It is not easy to judge the number by which the flock can be increased in any one year and it is reassuring to have a shed of hay should a drought prove one's judgment faulty, not to mention the insurance against eczema or the temporary feed shortage after an army caterpillar outbreak.



All that is required to complete this barn is to fit tie rods diagonally between the uprights.

Siting

The place for the small hay barn is obviously where the greatest reversion problem is encountered and where the cattle will be found working. The exact spot will be determined by the property, but a sheltered, well drained terrace in the lee of a ridge is suggested. The site should provide easy access, preferably downward to the surrounding steeper paddocks, and should have a track to it from the road capable in summer of taking a loaded truck straight to the barn. Use of a bulldozer to level the site and provide a decent track is recommended.

The barn should have a strong fence round it with a gateway to the leeward of the prevailing wind and opposite the open end. A slightly uphill approach to the entrance will keep the track well drained and will ensure that the truck, after being backed in loaded, can be readily driven out.

Provision of this barn will obviate use of a tractor and trailer on greasy, dangerous tracks to work from the homestead, and hay feeding in winter can be easily done by keeping a sledge and a quiet (hay fed) draught horse in the barn paddock.

Summary of Costs

Standard hay barns are generally too large and difficult to get on the site at a reasonable cost. The barn described is 16 ft square and 13 ft from ground level to the top of the uprights, and it holds 450 bales.

Cost of materials for the barn illustrated was:

	£
Uprights	17
Timber and paint	24
Roofing and hardware	23
Concreting	1
	65

Other costs are labour (40 man-hours on this job), cartage, and bulldozing, all of which are variable. For this barn £80 would cover all costs.

Materials Used

The sleepers were of heart rimu and the other timber of treated pine. The timber sizes were as follows: Sleepers 6 x 2 in., plates 4 x 2 in., rafters 4 x 2 in., ridgeboard and centreboards 6 x 1 in., interior rafter braces 3 x 2 in., end boards 4 x 1 in., purlins 3 x 2 in., and facia boards for finishing the outside 4 x 1 in. Other materials used were: Six (40 lb) tram rails each 16 ft long, four 7/16 in. threaded steel rods 9 ft 6 in. long, with nuts and washers for bracing the uprights, a small quantity of concrete for setting the uprights in, 16 10 ft sheets of roofing iron, 16 ft of ridging, and bolts, nails, and paint.

Building Details

Preparations at Home

A systematic approach can save hours of work. The time for building the barn illustrated was kept down to 40 man-hours by the following preparations at home:

At the homestead workshop 4 in. was cut off the body of the rails, leaving a flat end through which were drilled

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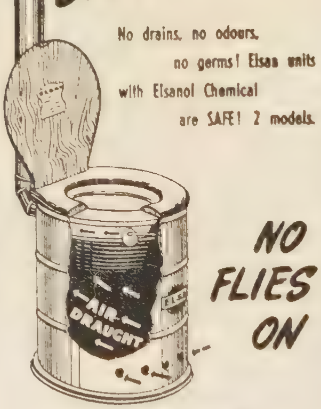
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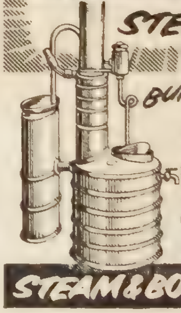

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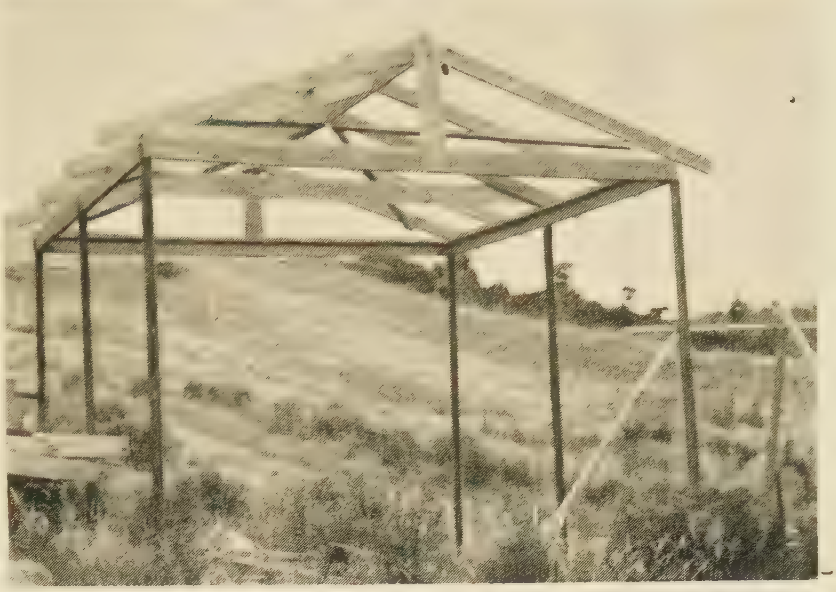
two holes for bolting on the sleepers. The uprights were laid out on the ground and the holes cut in readiness for fitting the steel bracing rods (two holes 9 ft from the top of the centre upright and a single hole 9 in. from the top of each corner upright). These holes can be most easily cut with an acetylene torch.

The four 16 ft sleepers, the four 16 ft plates, and the 10 9 ft rafters were cut, notched, and lapped on the ground. A 30 in. pitch on the roof is obtained by fitting the ridgeboard 30 in. above the plate. The rafters were butted in level with the bottom of the ridgeboard, leaving a 2 in. clearance to correspond with the 2 in. height of the three purlins per side above the rafters to allow the roofing iron to be fitted squarely. The remainder of the cutting out was done on the job with a truck making a good bench and working platform. If the barn can be built round a stack of bales, the job is further simplified.



The barn during building, showing structural details.

Laying out the Barn

After a clean and reasonably level site has been bulldozed, lay out the base 16 ft square by using the 3, 4, 5 right-angle triangle with the tape measure. Mark the corners with pegs and also the halfway points on the 16 ft sides. Drive another peg adjacent to each corner marker and, starting from the lowest corner, work around these pegs with a line-level, adjusting each peg until the line represents a level base.

Putting up the Frame

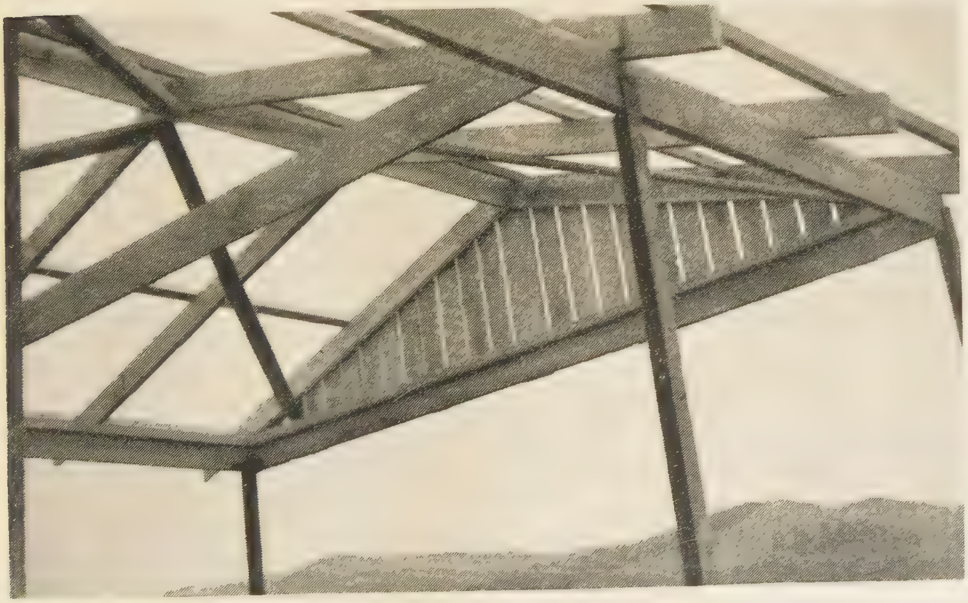
Dig down 3 ft from the level line at each marker for the six uprights. In soft earth allow for a small wooden plug at the bottom of each hole to prevent the uprights from sinking before being concreted. Lay out the sides on the ground close to the holes and bolt the sleepers to the corner uprights so that they will face inward. With two men to each corner and one man pulling on a rope attached to the centre of the sleeper, raise the sides in turn, so that the corner uprights slide into their holes.

Sling the end sleepers up with ropes over the side sleepers and send a small man up a ladder to join the pre-lapped corners. Square the corners with pieces of light timber nailed across the sleeper corners as braces and erect the centre uprights, bolting them squarely to the side sleepers. Fill the holes with concrete and leave it to set.

Putting on the Roof

Fit the four 16 ft plates flush with the outside edge of the sleepers, slot the centreboards and put them up 30 in. above the end plates, and fit the ridgeboard into the slot. Now butt the rafters in and fit the purlins and interior wind braces. Nail the end boards on to give the barn type finish, lay the roofing and ridging iron, and nail on the fascia boards. Finally, strain the four steel rods diagonally between the side uprights by taking up the slack thread to stiffen the frame.

The barn is not finished until it is painted, fenced, and filled with good hay.



Structural details as seen from within the barn.

WHEAT growing is one of the oldest and most important of the farming practices associated with the arable area of this country. This is especially so on the coastal plains and downlands of Canterbury and North Otago, which, for many decades, have been "the granary" of New Zealand. From the beginning of settlement the industry progressed rapidly, and for the past 80 years the total wheat area planted per year has normally exceeded 100,000 acres. A peak of over 400,000 acres per annum was achieved in the 1890s and since then 200,000 acres has been exceeded in most seasons.

Crop Production

WHEAT

← Aotea wheat is much more resistant to disease than Cross 7, is almost equal in baking quality, and has an average yield 26 per cent higher. It will undoubtedly become the leading variety in New Zealand.

By E. G. SMITH,*
Instructor in Agriculture,
Department of Agriculture,
Rangiora

Cross 7 wheat → was the most popular variety in New Zealand for 20 years. Despite recent failures in the South Island it may still be favoured for spring sowing in South Otago and Southland and for autumn sowing in the Wairarapa.

IN recent times the more remunerative returns from alternative farming products such as wool, meat, and small seeds have led to a markedly downward trend in wheat growing, resulting in a decline to a mere 66,000 acres in 1956-57.

Following the war years (1939-45) the widespread use of more persistent strains of grasses and clovers coupled with an improved understanding of pasture management has removed the need for frequent pasture renewal and breeding ewe numbers have gradually increased. Income from wool, fat lambs, and small seeds has been sufficiently attractive to meet the farmers' needs without the added labour associated with wheat growing. Further, with a memory of soil depletion brought about by years of unplanned cropping, farmers have been reluctant to cash the soil fertility built up by the heavy stocking of high class pastures.

In the 1958-59 season the area planted in wheat, 140,000 acres, was twice that of 1956-57 and there are indications that the 1959-60 season will bring still further increase. The greater area under the plough will hasten the programme of pasture renewal, and with the high stock-carrying capacity of younger pasture, an improvement in pasture utilisation, and an increased area in supplementary feed crops there need be no reduction in stock numbers.

Wheat production costs will vary from farm to farm and from season to season, but at current prices for our farm products wheat growing must be extremely attractive to men with suitable land, and there is no doubt that New Zealand could grow sufficient to meet her own requirements without really depleting the soil fertility which has been built up through improved farming methods. This improvement in soil fertility is reflected in the increase in wheat yields.

During the last 10 years the average yield has been about 40 bushels per acre, and with the widespread use of the better varieties now available there will probably be a further improvement during the next 10 years.

New Zealand Requirements

Before the war New Zealand required 9.5 million bushels of wheat a year; today the requirement is estimated to be 13.3 million bushels, comprising 8.6 million bushels for flour, 4.3 million bushels for feed and seed, and 400,000 bushels for breakfast foods. During the year ended 31 December 1957 five vessels, four of 5,000 tons and one of 3,000 tons, were continuously importing Australian wheat and landed 10,111,937 bushels at New Zealand ports.

Most of the Dominion's wheat is grown in Canterbury. Otago and Southland grow a substantial acreage and Marlborough and Nelson also grow wheat. The southern part of the North Island contributes a small proportion of the requirement.

The distribution of wheat production in recent years is shown in the table on the opposite page.

Varieties

Old varieties such as Solid Straw Tuscan, Hunters, Jumbuck, Marquis, and Dreadnought have practically

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* This article is a revised version of an article written by G. K. McPherson, Fields Superintendent, Department of Agriculture, Dunedin, and published in the February 1947 issue of the "Journal".

A Departmental trial comparing Aotea (left) and Gabo wheats for spring sowing in South Otago.

disappeared and have been largely replaced by Cross 7, Aotea, Arawa, Hilgendorf, and Fife Tuscan. These last-named varieties have all been bred by the Crop Research Division of the Department of Scientific and Industrial Research at Lincoln and tested for baking quality at the Wheat Research Institute, Christchurch. The imported varieties Gabo and Tainui are grown chiefly in the North Island.

A brief description of today's most important wheats is as follows:

Cross 7

Cross 7, the first variety bred for local conditions, was the most popular variety in New Zealand for nearly 20 years. It is admirably suited for header harvesting and its baking quality has been satisfactory. In recent years, however, autumn sowings of Cross 7 in North Otago and Canterbury have frequently been disappointing and there have been many partial failures through severe attacks of root diseases which produced discoloured heads with pinched grain and a resultant loss in yield.

Cross 7 may still find favour for spring sowing in South Otago and Southland and for autumn sowing in the Wairarapa.

Aotea

The new variety Aotea has all the desirable characteristics of Cross 7—a strong straw, resistance to lodging and shaking, and suitability for direct heading. Aotea is much more resistant to disease than Cross 7, it is almost equal in baking quality, and many carefully conducted field trials by the Department of Agriculture show its average yield to be 20 per cent higher than that of Cross 7. Though spring sowing is not generally favoured in North Otago and Canterbury, trials indicate that spring-sown crops of Aotea will outyield Cross 7 in most wheat-growing districts of New Zealand. This variety will undoubtedly become the leading variety in New Zealand, and there should by now be sufficient seed to meet all requirements.

Arawa

Arawa has almost completely displaced Dreadnought from the heavier soils of Canterbury and North Otago. It approaches Dreadnought in yield and has the advantage that it is suitable for direct heading. It matures some two weeks earlier than Dreadnought, and it is suitable for grazing, producing a particularly large flag. Though its baking quality is not high, it is no poorer in this respect than Dreadnought. On account of its comparatively poor baking quality it is advisable to restrict the use of Arawa to those areas where some early spring grazing is an essential feature of farm

SPREAD OF WHEAT PRODUCTION IN NEW ZEALAND
(Average of three harvests, 1955 to 1957)

Land district	Area threshed (acres)	Quantity harvested (bushels)	Percentage of total New Zealand production	Average yield per acre (bushels)
North Island	5,500	223,500	7	41.5
Marlborough-Nelson	2,000	58,000	2	29.0
Canterbury	52,000	2,020,000	62	39.0
Otago	12,000	532,500	16	44.5
Southland	8,000	409,500	13	51.0

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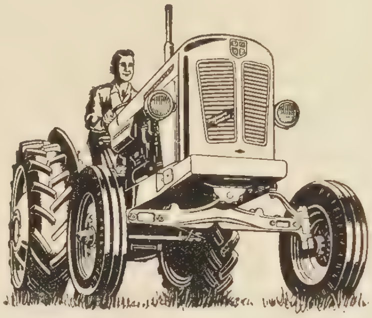

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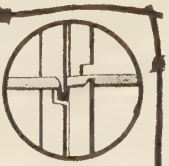

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▲ Arawa has almost completely displaced Dreadnought from the heavier soils of Canterbury and North Otago.

Tainui replaced the Jumbuck variety as a spring → wheat in the North Island because it was more suitable for heading and gave higher yields.

practice, where straw is required, or where control of weed growth is important.

Hilgendorf

Hilgendorf is particularly valuable because of its high baking quality, for which it commands a premium payment. Its yield is usually lower than that of Cross 7, but it has done exceptionally well in Marlborough and parts of Mid Canterbury. Hilgendorf matures about a week earlier than Cross 7. It is a short-strawed variety with a fairly tight chaff and is therefore suitable for direct heading.

Fife Tuscan

Fife Tuscan, which is closely related to Cross 7, was first distributed for sowing in 1940. It is taller than Cross 7 and later in maturity. Though it is not favoured in most districts, small areas are still grown on some of the lighter soils.

Tainui

Tainui replaced the Jumbuck variety as a spring wheat in the North Island because it was more suitable for heading and gives higher yields. Tainui is susceptible to both stem and leaf rusts and tends to lodge in wet seasons with a consequent reduction in yield.

Gabo

Gabo is an Australian wheat which has largely replaced Tainui in the North Island. Its straw is shorter and stronger than that of Tainui, its yield is somewhat higher, and it matures seven to 10 days earlier. Its ripe grain tends to sprout in a wet season and to shed if harvesting is delayed. Gabo has done well in the Rangitikei and Manawatu districts.

Soils and Climate

Though wheat demands a comparatively dry climate, ample moisture is essential at two critical periods: first, during October and early November to ensure the survival of the maximum number of tillers, and second, during the month before harvest to ensure satisfactory development of the grain.

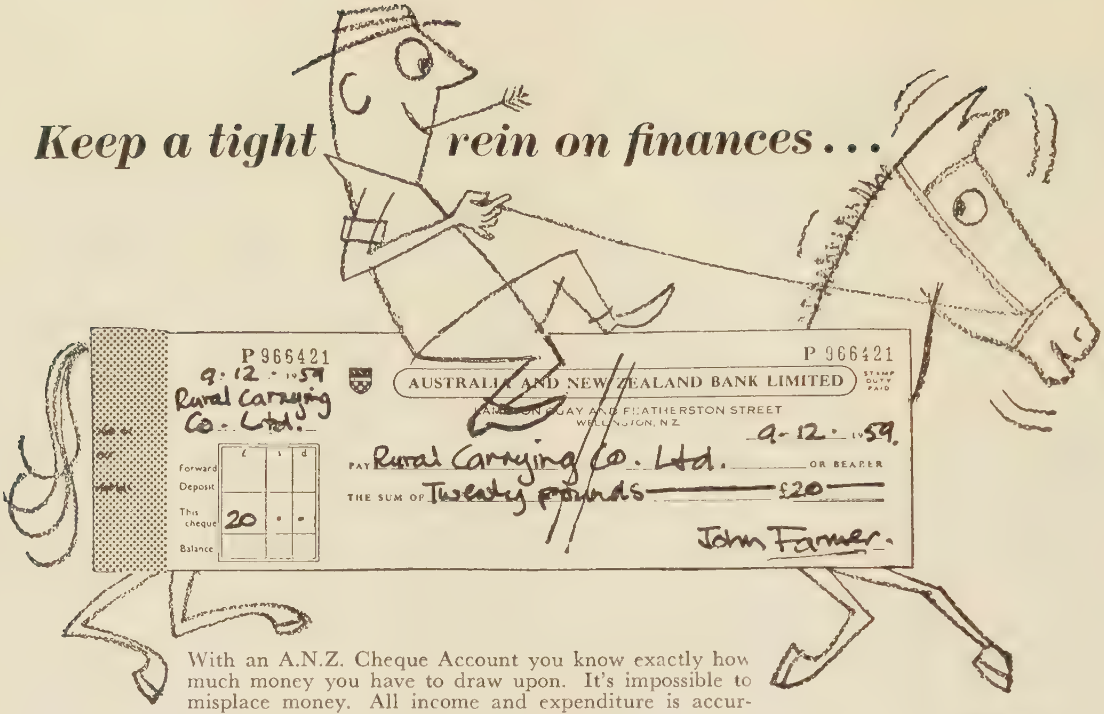
On the Canterbury Plains and downlands and in North Otago winter-sown wheat does well on a wide range of soils provided soil fertility is high and drainage adequate. Where drainage is less satisfactory in these districts spring sowing may be practised, but it should be confined to the heavy, fertile soils.

The main wheat-growing areas in the North Island are Rangitikei, Manawatu, Hawke's Bay, and Wairarapa, where a total of about 12,000 acres is now being grown annually.

On heavy land wheat may safely be sown every four to five years, on medium land every six to seven years, and on marginal soils every eight to 10 years.

Rotation

The place of wheat in the rotation may vary considerably even under similar conditions of soil and climate,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and the crop does well after rape, peas, linseed, or early-dug potatoes. After these crops land is fertile and friable and a minimum of cultivation is necessary. After pasture with a high proportion of clover wheat does particularly well, though cultivation costs are usually somewhat higher than when it is preceded by another annual crop.

On the heavier soils it is quite sound to sow a second crop of wheat, but this is not recommended on any but really fertile land, as the drain on soil fertility becomes too high and the physical condition of the soil is impaired. The crop rotation adopted should aim at maintaining soil in a fertile state both chemically and physically.

Preparation of Land

Cultivation for wheat must be deep, and the ideal seedbed is rather cloddy on the surface with fine, well worked soil underneath. If the surface soil is too fine, it becomes compacted during winter, whereas surface clods broken down by frost and rain earth up the plants. No hard and fast rules can be laid down about the use of implements or the best methods of cultivation, but it is doubtful if any crop gives a better response to thorough cultivation. Such factors as soil type, climate, the presence or absence of twitches, and the equipment available must all be considered in determining how to cultivate for a wheat crop.

After old pasture it is usual to skim plough in summer or early autumn, and if twitch is present, cross skimming during the summer fallow is advisable. Even where twitch is not evident early skimming or surface working allows time for decomposition of vegetation before deep ploughing is done. In Canterbury disc harrows are not widely used after the final ploughing. The grubber or cultivator is generally considered a more useful implement, as it brings clods to the surface and allows the finely worked soil to fall underneath.

When wheat follows a cereal it is usual to burn all dried straw or top growth before deep ploughing. Where it follows crops such as potatoes, linseed, peas, or rape one deep ploughing usually leaves the soil friable and little further cultivation may be necessary. In some cases only a tine harrow is used to level the furrow before sowing.

Time of Sowing

In Canterbury and North Otago most wheat crops are winter sown, and May and June have proved to be the most suitable months. The crop establishes but makes little growth over winter, but it develops a good root system and as soon as conditions are warmer in spring growth and tillering are fairly rapid. Later sowings result in slow root development, and an extensive rooting system is essential if the crop is to thrive during dry periods.

In these districts spring sowing is practised only when climatic conditions have been unfavourable in winter. It should be confined to good land and districts with a relatively high rainfall, as success largely depends on adequate rainfall during the critical months of November and December.

In the remainder of Otago and in Southland practically all wheat is sown in spring, usually after winter feed crops. The land is ploughed and worked as soon as the crop is fed; sowing begins in August and if a late harvest is to be avoided, should be completed during September. Spring sowing is also the rule in the North Island, where wheat may follow either a supplementary feed crop or old pasture.

Seeding Rates

The type of soil, the time of sowing, and the farmer's fancy are the three principal factors which influence the seeding rate per acre. The rate varies from 1¼ to 2 bushels per acre for winter wheat, though there appears to be little justification for the use of more than 1½ bushels of seed. Spring-grown crops do not tiller to the same extent as those sown in autumn and therefore a higher seeding rate is recommended. In the North Island and in Otago and Southland the rule is 2½ to 3 bushels per acre. These rates refer to good seed of high germinating capacity.

Some 30 years ago the Department of Agriculture instituted a certification scheme for all the more important wheat varieties grown in New Zealand. This scheme enables growers to buy lines of seed wheat which are relatively free from seed-borne diseases and foreign varieties.

Fertilisers

During the past 30 years the Department of Agriculture has carried out a large number of wheat-manurial trials in the main wheat-growing districts of New Zealand. The results of these experiments can be summarised as follows:

1. From 1928 to 1933 an application of 1 cwt of superphosphate drilled with the seed increased the average yield by 4 to 6 bushels per acre, but since then the average increase has fallen to less than 2 bushels. This is no doubt due to a build up in available phosphorus compounds in the soil through the more widespread use of superphos-

Gabo is an Australian wheat which has done well in the Rangitikei and Manawatu districts.

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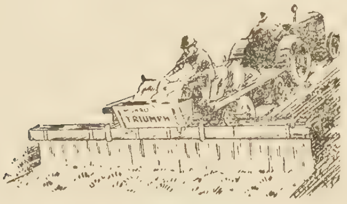

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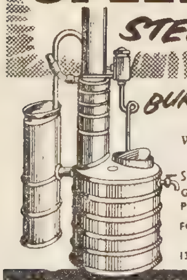

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phate as a pasture topdressing. Today on the more fertile soils of Canterbury the use of superphosphate with autumn-sown wheat is not generally recommended. On the less fertile soils and where wheat follows a grain crop 1 cwt of superphosphate should be sown with the seed.

2. Results from the use of serpentine superphosphate have not been significantly different from those obtained with 1 cwt of superphosphate.

3. Other forms of phosphate such as North African and Nauru rock phosphate and lime-reverted superphosphate have been inferior to either of the above forms.

4. The use of potash has not been profitable.

5. Results from the use of nitrogenous fertilisers have been extremely variable, and under normal climatic conditions the use of these manures is not warranted if soil fertility is reasonably high. If after an exceptionally wet winter the wheat crop suffers from "spring yellows" due to deficiency of available nitrogen, a spring topdressing of 1 cwt of fertiliser such as sulphate of ammonia will usually pay. It should be noted that yellow leafage also results from infections with "yellow dwarf" virus and fusarium root rot.

After Cultivation

Under normal conditions it is advisable to harrow winter-sown wheat once with tine harrows, but if the surface soil is severely crusted, further harrowing may be necessary. Immediately harrowing is completed the crop should be rolled with a Cambridge roller. The object of the harrowing is to loosen the surface crust which may have formed as a result of winter rains. Rolling breaks down clods, packs the soil round the young wheat plants, and provides a smoother surface for harvesting operations. Even after a mild winter whenever the soil remains friable harrowing is recommended for weed control.

It is a common practice in Canterbury to sow down to grass in spring after winter wheat has established. The pasture mixture is drilled or broadcast either before harrowing or rolling or else between the two operations.

Grazing of Wheat

The belief is widely held that grazing wheat promotes tillering, but this has not been shown in practice. However, judicious grazing is not detrimental to a strong-growing crop provided stock are removed from the paddock before the seed head begins to form in the sheath. If spring feed is short, the crop may be safely grazed provided the mob of sheep is large enough to ensure rapid and even grazing. On exceptionally strong land or in favourable seasons when there appears to be a danger of the crop making rank growth which will eventually lodge, grazing with sheep or cattle is recommended. If stock are not available, wheat may be safely topped with the mower and the toppings left to wilt. Rank wheat crops are prone to develop mildew and produce poor grain samples. Unfortunately grazing is more necessary usually in those seasons when supplementary green feed is less essential.

Varieties such as Arawa are particularly suitable for grazing and this may prove of considerable value in providing a green bite for ewes just before lambing.

Weed Control

Weeds in wheat may be controlled by hormone-type chemical weedkillers, and provided spraying is done at the correct stage of growth of the crop, satisfactory results will be obtained. Hormones will damage wheat at two distinct stages of growth. The first is before the six true-leaf stage. The number of leaves is determined by counting the leaves on the main tiller and adding one leaf for each secondary tiller. The second stage is the "boot" stage, after the seed head begins to form in the sheath.

If the weeds are largely germinating annuals and perennials, spraying should be done as near to the six true-leaf stage as possible. If the weeds are coming from root regrowths, later treatment is recommended, but this should be done well before the boot stage; otherwise crop yields will be substantially reduced.

The most suitable preparations for weed control in wheat are water-soluble salts and amines of MCPA at rates of up to 1 lb per acre, or MCPA at ½ lb per acre applied at the early tillering stage. These will control most of the common weeds including wild turnip and Californian thistle, but are not effective against weeds such as cornbind. If these are troublesome, the polythene glycol ester of 2,4-D should be used at not over 1 lb per acre.

Aerial spraying of wheat at the mature stage may be necessary to dry off weeds and thus facilitate harvesting. For this purpose either the potassium salt of MCPA or the amine salt of 2,4-D at 1 lb per acre would be suitable.

Harvesting

Today's recommended varieties are all suitable for direct heading and the bulk of the New Zealand wheat crop is harvested by this method.

The crop should be allowed to stand until it is dead ripe, when all knots of the straw will be quite dry and the grain hard. For windrowing the crop is cut when greenness shows only at the knots of the straw and the grain is firm.

Bulk Handling

Though Sir Walter Mulholland pioneered bulk-handling operations in Canterbury in 1930, this method of harvesting has not become popular and it is reported that it was practised on only seven farms in the South Island last year. However, with an increase in the wheat acreage greater interest is being shown in this method of harvesting and machinery firms are now making arrangements for the supply of bulk handling machines and tank attachments which can be fitted to the bagging type of header harvester.

The cost of the bulk handling machine is about the same as that of the self-propelled bagging machine. Provided moisture is down

Features of Wheat Growing in New Zealand

Area grown: In recent years about 100,000 acres, falling as low as 66,000 acres in 1956-57, but recovering to 140,000 acres (estimated) in 1958-59.

Main growing districts: Canterbury, with smaller areas in Otago, Southland, and Wellington Land Districts.

Varieties: Aotea—a variety for general wheat growing.
Arawa—on heavier soils where Dreadnought previously grown
Hilgendorf—a premium wheat for parts of Marlborough and Mid Canterbury
Fife Tuscan—for lightest soils
Cross 7—for spring sowing in Otago and Southland
Tainui } —for spring sowing in North Island
Gabo }

Normal sowing rates: Seed—autumn, 1½ bushels; spring, 2½ to 3 bushels
Fertiliser—1 cwt of superphosphate only if soil not in good heart

Normal sowing period: May or June in Marlborough, Canterbury, North Otago, and other autumn-sowing districts
August/September in rest of Otago, Southland, and North Island

Average yield: 40 bushels per acre, with a tendency to increase

Commercial bushel weight: 60 lb

YOUR HOGGETS, FRED, HAVE HAD SOME UPS AND DOWNS...

FRED MACKENZIE

is a fictitious character. In these advertisements, he stands for all *New Zealand farmers, whether they be concerned with meat or wool or fruit or dairy produce. The story of his hoggets is the story of all New Zealand produce which is shipped to markets overseas.*

You've read a book or two, maybe, of the sailor's joy on nearing land after endless days at sea. You've read, maybe, of the Galapagos Islands—volcanic once, and now the home of sea birds and lizards. Well, Fred, we passed them as we made our way to Balboa.

And then, of course, we had the Canal. Lush, tropical vegetation, exotic-coloured birds, and slap through the middle of it all, 40 miles of seaway—an amazing piece of work when you think it was finished 45 years ago. And the first thing that happens, when you come into the Canal at Miraflores, is that the ship is raised 54 ft. above sea level. That's quite a height Fred. Then, at Pedro Miguel, the next lock, you go up another 31 ft. It all comes right in the end, of course. At Gatun Lock on the Atlantic Side, you go down 85 ft. and you're back where you started from. But not quite. Ever since we left Napier, we've been burning oil and using water—800 tons of oil and 375 tons of water—and that's made quite a difference to our weight. We're riding 18 in. higher out of the water now. So—quite apart from the ups and downs in the Canal—your hoggets are a bit higher up in the world than they were when we started. But they aren't worried, Fred. They're keeping quite cool in No. 3 Lower Hold. And at his control panel, Harry Briggs, the Chief Freezer, is making sure they stay that way. And, come hell or high water, your hoggets, Fred, will reach London in prime condition.

NEW ZEALAND OVERSEAS SHIPPING LINES

SHAW SAVILL & ALBION CO. LTD · THE NEW ZEALAND SHIPPING CO. LTD · PORT LINE LIMITED · BLUE STAR LINE LIMITED to 15 per cent, the grain can be shifted directly from harvester to rail. To avoid congestion at flour mills and grain stores monthly increments for a maximum of three months are paid to growers holding wheat on the farm. If the grain is taken directly to storage bins on the farm, it can be held at little cost until maximum increments apply. Should the moisture content be greater than 15 per cent, the grain must go to drying bins until it is in the desired condition for storage.

Fungous Diseases

Ball Smut or Stinking Smut (*Tilletia foetens*)

Ball smut is a fungous disease resulting in the development of smut balls instead of grain. Most of these balls are broken during threshing and contaminate the rest of the grain, causing the whole line to have an unpleasant, fishy smell. The spores of ball smut are carried on the surface of the grain and the disease can therefore be controlled by pickling or dusting of the grain.

Dry dusting of seed wheat with organic mercurial dusts has replaced the old wet pickles such as bluestone and formalin which frequently had an adverse affect on germination. These dusts are easier to apply, the grain is more convenient to drill, and the seed can be treated at any time between harvest and sowing. Organic mercurial dusts are used at the rate of 2 oz per bushel and the work is usually done by dusting plants in seed stores. Overdusting of seed or dusting of seed which is out of condition is likely to result in poor germination. Treatment of "fit" grain at the recommended rate has proved so effective that it is doubtful if any farmer in Canterbury has seen ball smut during the past 10 years.

Loose Smut (*Ustilago tritici*)

Loose smut is apparent when the wheat is in flower. A mass of black powder spores replaces the seed head. The spores are blown by wind and any that alight on the developing grain of healthy plants immediately germinate and penetrate the grain, leaving no outward sign. However, when affected grains are sown the fungus grows with the plant, which in turn produces a further crop of heads infected with loose smut the following season.

As the fungus passes its resting stage inside the grain and not on its surface as does ball smut, it cannot be controlled by surface treatment of the grain and no reliable treatment can be carried out on the farm. Loose smut is controlled by hot water treatment, which is the work of a specialist.

Each year a quantity of seed wheat is treated at the Crop Research Division and later sown in special areas where it produces certified Pedigree seed. By further multiplication a supply of seed once or twice removed from hot water treatment goes into the certified seed trade each year and by this means the disease is being kept at a very low level. The farmer can do nothing to control loose smut except use certified seed.

Take All (*Aphiobolus graminis*)

Take all is a fungous disease which attacks plants at or below ground level. The fungus usually causes a blackening of the bases of the stems. Take all tends to occur in more or less circular patches. Near the centre of affected areas the plants may die before the ears appear. Even if flowering does take place, affected heads will contain no grain or only partially developed grain. The spores remain on stubble after harvest and so the soil is reinfected and will remain infected for a number of years. There are no known remedies once a crop is infected, but after harvest all straw should be burnt and the paddock spelled from wheat or barley for four or five years.

Rust (*Puccinia* spp.)

Two types of rust are found in wheat—leaf rust (*P. elymi*) and stem rust (*P. graminis*).

Leaf rust occurs in wheat crops in varying degrees every year, but appears to do little damage. Stem rust is less common and though it may affect grain samples to a limited extent, it is not considered to be of economic importance. These diseases are more prevalent in seasons of damp, muggy weather.

There is no known method of treating either the seed or the crop to control rust.

Root Rot (*Fusarium* spp.)

Root rot is caused by *Fusarium*, a weakly parasitic soil fungus which may attack and kill wheat plants from the seedling stage to the flowering stage. The fungus attacks the rooting system of the plant and the basal portion of the stem. If the plants are attacked in the early stages of growth, the disease is known as seedling blight. Severely affected plants wilt and die, but only very occasionally does the trouble cause complete crop failure. In slight attacks the plants have a stunted, yellow appearance in spring, a condition known as "spring yellows". Infection at or near flowering causes a bleached and empty head commonly called "white head".

No methods of control for this disease are known. Thorough cultivation, adequate drainage, and not drilling too deeply will all help prevention and there is some evidence that seed treatment with thiram or a mercurial dust may give some protection.

Eyespot (*Cercosporella herpotrichoides*)

Eyespot attacks the lower portion of the stem of the wheat plant, so weakening the straw that severely affected crops may collapse near flowering time and partially affected ones have a tangled appearance. When the straw becomes lodged the flow of sap to the head is partly arrested, with the result that the grain may be pinched.

Initial infection of an area may be through the seed, infected straw, or harvesting machinery. There is a suggestion that the fungus builds up in an area.

Refraining from using seed from an infected crop, burning stubble, practising a wide wheat rotation, and avoiding the use of infected straw are precautionary measures recommended in areas subject to eyespot.

Powdery Mildew (*Erysiphe graminis*)

Powdery mildew occurs frequently and is often widespread. The heaviest incidence generally occurs in autumn-sown wheat after a mild winter and during dry spring or early summer conditions. Once infection is established progress of the disease is encouraged by damp, humid conditions and it spreads rapidly throughout dense, "flaggy" crops.

It appears as extensive greyish patches of fungus threads attached loosely to the leaf surfaces and lower portions of stems. Plant vigour is restricted, though plants are seldom killed. None of the commonly grown wheat varieties is immune to mildew, though some, notably Hilgendorf and Cross 7, are generally more susceptible than others.

There is no practical method for field control, but the Crop Research Division has made considerable progress toward evolving mildew-resistant strains of Hilgendorf and Cross 7.

Yellow Dwarf Virus

Yellow dwarf virus was first described from California, United States of America, in 1951, when it was reported to be causing serious losses in wheat, oats, and barley. Since then the disease has been recorded in both the North and South Islands, but has reached serious proportions in New Zealand only during the 1953-54 season and the 1957-58 season, when the incidence in some wheat crops was over 20 per cent.

In severely affected seedling plants the leaf margins are serrated, while older plants show a premature bright yellowing (or reddening in Hilgendorf and Tainui), especially toward the leaf tips. At flowering affected plants have a greater number of tillers and many stunted heads at irregular heights from the ground. At ripening plants frequently develop a black mould on the heads and straw. This is probably a secondary infection.

Little is known about control measures and no variety has been found to be resistant to the disease. Field trials are being carried out to test the possibility of spraying to control the virus.

Insect Pests

Hessian Fly (*Mayetiola destructor* Say.)

The Hessian fly causes considerable loss in New Zealand wheat crops each year. This small fly lays its eggs in November on the wheat flag and the maggot crawls down to the second node between the leaf sheath and the stem. There it sucks the sap from the tender straw, causing a shrivelling of seed and some straw break. In late summer the maggot goes into the resting stage known as the "flax seed larva". It is a small brown object the size of half a seed of linseed.

It is in this stage that it overwinters in wheat straw and stubble, and burning is the best method of control. Deep ploughing of stubble will also reduce the number of pupae which develop into mature insects in spring. The practice of spring sowing a pasture mixture under winter-sown wheat crops assists in perpetuating this pest.

Wheat Bug (*Nysius huttoni* and Others)

In some seasons the developing wheat grain is attacked by bugs which usually live on the sap of grasses and weeds. These bugs attack wheat in the milk stage and suck the sap from the developing grain and at the same time inject into the grain a substance which causes the gluten to change so that satisfactory bread cannot be made.

In New Zealand three species attack the wheat grain and cause this trouble known as "slimy gluten". Two of these insects are native to New Zealand and are found in most pastures, and the fact that the annual damage is considered to be of minor importance suggests that it is only under exceptional circumstances that the bugs attack the wheat.

Argentine Stem Weevil (*Hyperodes griseus* Hust.)

Though this pest attacks seedling wheat, its presence is not usually recognised until the wheat is nearly ripe and even then the damage it does is frequently attributed to Hessian fly.

During winter the insect remains in the soil in the adult stage. In October it lays its eggs on the wheat plant, and the small white grubs which develop bore into the stems of the plant. If the plants attacked are very young — particularly spring-sown wheat—the grub bores down the centre of the succulent stem and either weakens or destroys some plants or tillers. When the wheat is attacked at a later stage of growth the grubs usually concentrate on one of the lower nodes of the stem, creating a weakness in the straw with consequent straw break during high winds before harvest. The weevil also attacks barley and ryegrass.

Grass Grub (*Costelytra zelandica*)

The grass grub which is a native of New Zealand does considerable damage to wheat crops each year, and a heavy grub population can be responsible for crop failure. Evidence of grub attack is first noticed in the establishing stage of the crop and may continue through September. If the grub population is high throughout the paddock DDT applied at 1½ lb per acre is recommended.

Army Caterpillar and Cutworms

(*Persectania ewingi* and *Pseudaletia separata*)

The caterpillars of various species of nocturnal moths can cause considerable damage in cereal grain crops, especially during dry summers and autumns. They partially or wholly sever the stems of plants near ground level, or may even ascend the stalks to cut the stem just below the ear.

Spraying with insecticides such as DDT or dieldrin will control these pests.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given during April as follows:

1XH Hamilton, 12.33 p.m. 11 April—"Improvements in Surroundings and Drainage at Farm Dairies", by L. E. Downs, Special Inspector, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m. 6 April—"Farm Killings for Human Consumption", by M. B. McKenzie, Livestock Instructor, Department of Agriculture, Tauranga. 20 April—"Improvements to Surroundings and Drainage on Farm Dairy", by L. E. Downs, Special Inspector, Department of Agriculture, Hamilton.

2YZ Napier, 7.10 p.m. 5 April—"Duties of a Sheep and Wool Instructor", by H. R. Lusk, Sheep and Wool Instructor, Department of Agriculture, Hastings. 19 April—"Seasonal Work with Bees and Hives", by L. J. S. Line, Apiary Instructor, Department of Agriculture, Hastings.

2ZA Palmerston North, 12.36 p.m. 11 April—"Soil Deficiencies", by R. A. S. Waters, Horticultural Advisory Officer, Department of Agriculture, Palmerston North.

2XP New Plymouth, 8 p.m. 7 April—"Wool Field Notes", by P. C. Marshall, Sheep and Wool Instructor, Department of Agriculture, Wanganui. 21 and 28 April—"Radio Vet.", by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth. "News and Views from the Department of Agriculture's Farm Advisory Division, by G. R. Moss, Farm Advisory Officer, Department of Agriculture, New Plymouth.

3YA Christchurch, 12.20 p.m. 4 April—"New Developments in Pasture Topdressing", by R. L. Bennetts, Fields Instructor, Department of Agriculture, Christchurch.

4YA Dunedin and 4YZ Invercargill, 12.30 p.m. 4 April—"Soil Conservation is Important", by W. O. Sly, Soil Conservator, Department of Agriculture, Invercargill. 11 April—"New Methods in Farm Drainage", by I. R. Falconer, Drainage Advisory Officer, Department of Agriculture, Invercargill.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m.—"Country Journal", including "Report from Ruakura"; Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m.—"Country Journal"; Thursdays at 12.33 p.m.—"News for the Farmer".

1XN Whangarei, Mondays at 8 p.m.—"Northland Stock Market Report" followed by "Farming for Profit"; Wednesdays at 8 p.m.—"Farming for Profit"; and Fridays at 12.33 p.m.—"Farm News".

1XH Hamilton, Mondays at 12.36 p.m.—"For the Farmer" (excluding first Monday in month and public holidays); Wednesdays at 12.33 p.m.—"Report from Ruakura".

1YZ Rotorua, Wednesdays at 7 p.m.—"Bay of Plenty Journal"; Thursdays, 12.33 p.m.—"News for the Farmer".

2YZ Napier, Tuesdays at 7.10 p.m.—"The Hawke's Bay Farmer"; Thursdays at 12.33 p.m.—"News for the Farmer".

2XG Gisborne, Tuesdays at 8 p.m.—"Farm Session"

2XP New Plymouth, Thursdays at 8 p.m.—"Farm Session".

2XA Wanganui, Mondays at 8 p.m.—"For the Man on the Land"; Tuesdays at 8 p.m. "Farm Supplement"; and Thursdays at 8 p.m.—"Farm Topics".

2XB Masterton, Fridays at 6.45 p.m.—"Farm Session".

2XN Nelson, Thursdays at 8 p.m.—"Nelson Farm Topics".

2ZA Palmerston North, Mondays at 12.36 p.m.—"Country Digest"; and Fridays at 8.30 p.m.—"Country Digest" (including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m.—"Farm Session"; Thursdays at 12.33 p.m.—"News for the Farmer".

3YA Christchurch, Mondays at 12.20 p.m.—"Country Session"; Thursdays at 12.33 p.m.—"News for the Farmer"; and 7.10 p.m.—"Home Paddock".

3XC Timaru, Wednesdays at 8 p.m.—"Farmers' Weekly News Service"; and Saturdays at 10.30 a.m.—"Country Mailbag".

3YZ Greymouth, Mondays at 12.36 p.m., Thursdays at 12.33 p.m.—"News for the Farmer".

4YA Dunedin, Mondays at 12.36 p.m., Wednesdays and Thursdays at 12.33 p.m.

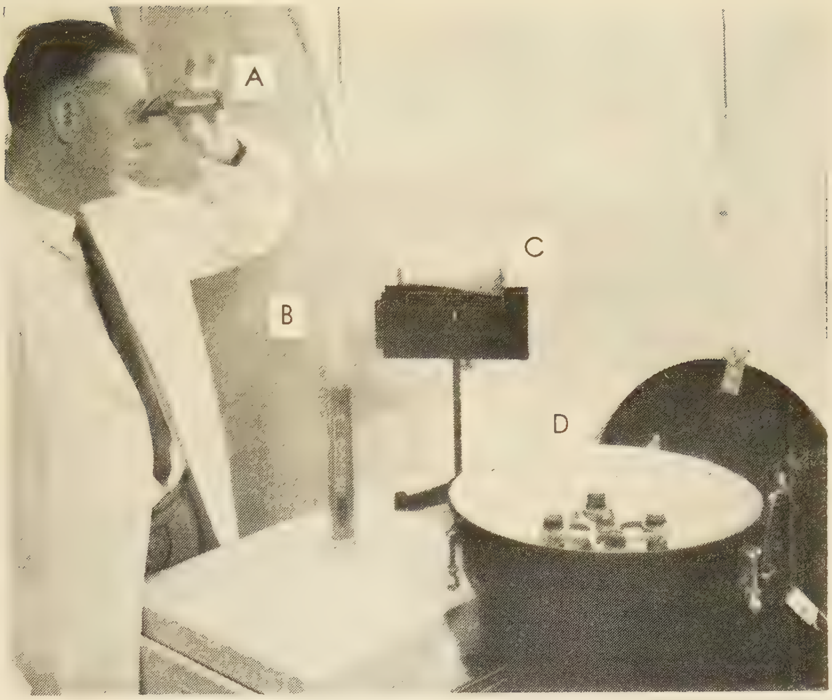
4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m.—"News for the Farmer".

Wool Sales

The dates and venues of wool sales up to the end of May are:

23 March: Wanganui.
28 and 30 March: Auckland
4 and 6 April: Napier.
11 April: Wellington.
23 April: Christchurch.
28 April: Dunedin.
2 and 4 May: Invercargill.
13 May: Wanganui.
18 May: Napier.
23 and 25 May: Auckland.
30 May: Wellington.

Factors Affecting Honey Quality



[Sparrow

Instruments assist greatly in the preparation of uniform blends during honey grading. Illustrated are: A—Honey refractometer for measuring the water content of honey samples. B—Chataway honey hydrometer for measuring water content in larger volumes of honey. C—Pfund colour classifier for determining accurate colour readings. D—Electric centrifuge for clarifying honey before testing for colour.

NEW ZEALAND beekeepers generally are excellent honey producers and their methods, plant, and equipment are equal to the best in other beekeeping countries. A profound knowledge of honey production does not necessarily provide beekeepers with the technical qualifications required to supply the consumer with packed honey of the highest quality, though there are a number of producers and packers whose honey leaves little to be desired and reaches the market in excellent condition. To protect the quality of honey precautions are necessary even before it is produced. These must be strictly observed in apiary practices and during extracting and packing. More producers are entering the retail trade and are experiencing its problems, and this article by R. S. Walsh, Honey Grader, Department of Agriculture, Auckland, offers such producers some suggestions for preserving and improving the quality of honey from its inception as nectar until it reaches the retailers' shelves as packed honey.

SOURNESS and early fermentation of honey occurring in some districts can be traced to combs of honey stored over winter in the honey house and fed to the bees the following season. A separate and specifically designed part of the honey house, or better still a special building, should be used for storing feed honey. Only the best supers should be used and each stack of supers should stand in metal trays and be well covered.

Feed honey stored under crude conditions is a serious source of contamination. Souring honey fed to bees will leave a taint in the combs which can be imparted to freshly gathered nectar. Honey tainted in this way is seldom low in specific gravity when it first reaches the market.

Honey houses in which feed honey is annually stored without special provision emit an odour of fermentation and remain a permanent source of contamination to all honey extracted or stored in them.

Wet Combs

Many beekeepers store their extracted combs "wet" over winter. This is not desirable, particularly in the North Island. The honey remaining in the combs absorbs moisture, allowing yeasts to develop which will contaminate the new season's honey stored later in these combs. Over-wintered wet combs can also transmit sour taints and any undesirable flavour from low-quality honey previously gathered. Climate in parts of the South Island is similar to that in the North Island and over-wintered wet combs can be just as unsatisfactory in these areas.

In addition to the danger of tainting and fermentation, coarse crystals are inevitably added to the new season's crop. Heating honey to a temperature of 140 degrees F for 30 minutes will destroy yeasts, but does not melt out all the dextrose crystals carried over in such combs. The larger the crystals are the greater or more prolonged is the heat required to melt them. This is the reason why some packs of honey develop coarseness of grain, though given the standard treatment successfully applied to the average pack.

Early Extraction Recommended

Nothing is to be gained from leaving honey on the hives any longer than is necessary. As the cooler weather approaches atmospheric moisture increases, pervades the hives, and is absorbed by the honey. Clustered bees and hives weak in bees cannot cope with such excess moisture and strong hives have to cope with additional moisture created by the exhalations of the occupants. Honey that has been extracted while the weather is dry and warm is in the best condition for storing in 60 lb tins for repacking later in the year.

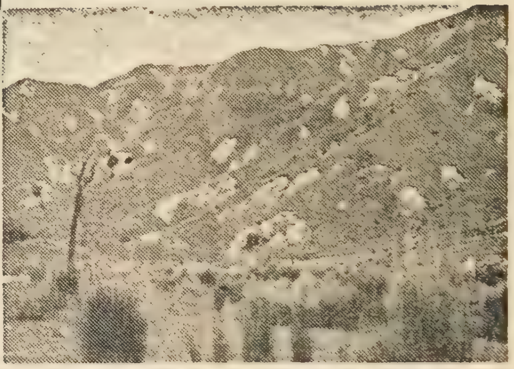
It is not generally known that granulated honey ferments much more readily than liquid honey. When dextrose hydrate crystals are formed the liquid phase has a higher water content than the entire honey had before granulation. Unless honey has a high specific gravity it cannot support an increase in water content, and in most honeys only a slight increase permits the growth of sugar-tolerant yeasts which, unless destroyed by sterilisation, will result in fermentation.

If possible, honey should be stored at temperatures below 55 degrees F.

what is soil conservation?

PATTERN FOR PRODUCTION

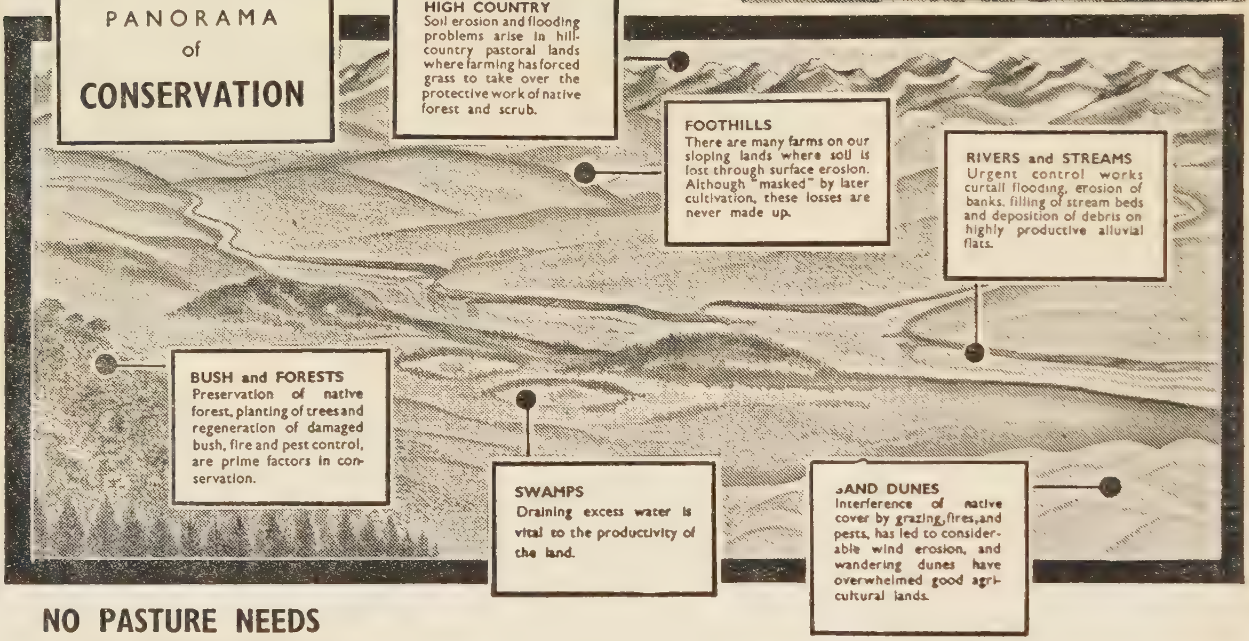
No. 1 of a series.



From our farmlands stem the welfare of New Zealand and the wellbeing of New Zealanders. Our economic stability depends on the stability of our soil...yet thousands of highly productive acres are endangered by erosion.

The land we have we must hold!

CONSERVATION IS THE SOLUTION



The
PANORAMA
of
CONSERVATION

HIGH COUNTRY
Soil erosion and flooding problems arise in hill-country pastoral lands where farming has forced grass to take over the protective work of native forest and scrub.

FOOTHILLS
There are many farms on our sloping lands where soil is lost through surface erosion. Although "masked" by later cultivation, these losses are never made up.

RIVERS and STREAMS
Urgent control works curtail flooding, erosion of banks, filling of stream beds and deposition of debris on highly productive alluvial flats.

BUSH and FORESTS
Preservation of native forest, planting of trees and regeneration of damaged bush, fire and pest control, are prime factors in conservation.

SWAMPS
Draining excess water is vital to the productivity of the land.

SAND DUNES
Interference of native cover by grazing, fires, and pests, has led to considerable wind erosion, and wandering dunes have overwhelmed good agricultural lands.

NO PASTURE NEEDS TO BE UNPRODUCTIVE

To meet every conservation requirement there is a proven programme available.

Bulletins Available

"Giving Wings to Soil Conservation" No. 11.
"Conservation Farming for Hill Country" No. 15.

Pioneer investigations by catchment boards and Government Departments have resulted in the development of many conservation methods. Advice is free - and subsidy is available for erosion control. Upon application to a catchment board or the Department of Agriculture a farmer can have the land capability of his property assessed and a conservation farming programme prepared and geared to his own resources for a five-year period.

POST THIS COUPON FOR FREE BULLETINS AND ADVICE to:

THE SOIL CONSERVATION & RIVERS CONTROL COUNCIL,
P.O. BOX 8024, WELLINGTON.

Please forward, free of charge, the following Conservation Bulletins. (No.s) ....

Would you like a field officer to call and discuss your conservation problems? YES/NO

NAME ______________________________

ADDRESS ______________________________

____

SOIL
CONSERVATION
OFFERS
PLANNED
ECONOMY

THE SOIL CONSERVATION AND RIVERS CONTROL COUNCIL.

Temperatures around 60 degrees F should be strictly avoided, as fermentation occurs at this point much more readily than at any other temperature.

Under-capped Honey

That honey should be well capped before removal from the hives is well understood by producers, but its importance is such that reiteration is always justified. Recent investigations have shown that up to 80 per cent of water can be held in uncapped portions of a frame of honey, and the moisture entering a tank from 50 to 100 such combs must be considerable. Even fully capped combs frequently contain excess moisture and have been observed actively fermenting. No doubt the light-bodied honey found at times on the surface of tanks that have been well covered could be traced to this source.

It is important that queens should not fail during a honey flow, as this results in a falling off in the efficiency of the house bees and stored nectar is liable to be neglected, leaving the water content much too high.

Starter Honey

Sourness and fermentation in packed honey can be traced in a surprising number of instances to the starter honey used. This may not be generally realised, but starter honey low in specific gravity is a definite source of contamination. Some of the methods used in producing creamed and spreadable honeys require a more than average amount of starter. Starter should be specially prepared for the work it is to do.

Honey set aside as starter should be sterilised and "seeded" with a small quantity of fine-grained honey from the current season's crop and kept in the cool room until required. It is a common practice to leave sufficient honey in the packing tank to "start" the honey with which the tank is refilled. This would be preferable with new season's honey to using old starter that may be souring or low in specific gravity. It is, however, a poor method if a consistently fine grain is to be maintained.

Every tank of honey requires some fresh starter. If a portion is left in the tank for starting, the only genuine starter the fresh honey entering the tank receives is the small proportion of the original starter contained in the honey left in the tank. Before the honey allowed to remain in the tank in the belief that it is all starter could reach this condition it would need to be placed in the cooler for a minimum of eight days to allow the "seed" to develop.

Agitation

There is a demand for "spreadable" honey and some methods used to produce this class of honey have resulted in too much agitation of the product. Honey so treated loses its flavour and becomes so impregnated with air that the container cannot always hold the correct weight of honey.

Honey of low moisture content can stand a certain amount of agitation and retain its keeping qualities, but honeys approaching a specific gravity of 17.2 per cent cannot stand excessive stirring and pumping at high speeds. Large quantities of air bubbles containing yeast cells become incorporated in the honey and the agitation breaks down the crystals, releasing the water held in suspension. This provides a suitable medium for the development of yeasts and fermentation quickly follows. Though darker honeys appear lighter in colour, they lack the lustre of normally treated honeys and soon develop a muddy or mottled appearance.

The demand for spreadable honey creates difficulties for producers, as the degree of plasticity in all honey with a normal laevulose/dextrose (L/D) ratio is governed by its water content. Naturally spreadable honey is always high in specific gravity and the phenomenon known as "frosting" does not occur in this type of honey.

Protective Covering

It was once considered correct practice to expose honey in open tanks for ripening. No greater fallacy could be imagined in the light of present knowledge, especially in the New Zealand climate. Honey readily takes up moisture from the atmosphere when the humidity is above 60 per cent. In many areas in the North Island humidity is mostly above this point and even in the South Island it is surprising how frequently humidity is high, especially at night and in the early morning. Humidity is relative to the temperature of the air and hot air can hold a lot more moisture than can cold air. Tanks and other utensils holding honey, extractors, supers of honey, and wet combs should be kept covered to the fullest possible extent.

It is hygienic frequently to sterilise honey house equipment and it also provides protection against dangerous yeast cells.

Blending

The blending of various honeys should result in a pack of uniform colour and flavour if the blender is familiar with the natural characteristics and the various flavours of the honeys used.

In districts producing predominantly clover honeys blending may not be necessary, but provided the blending is confined to clover sources, few problems are likely to be encountered. It is, however, much more complex to prepare a good blend from a variety of honeys.

Overseas firms specialising in honey employ blenders who follow methods similar to those practised by the Honey Marketing Authority's depot in Auckland. Grading with the help of scientific instruments assists greatly in the preparation of uniform blends. The Pfund honey classifier gives accurate colour readings and a refractometer or hydrometer determines the moisture content of the honey. The grader is also familiar with the various flavours, off-flavours, taints, and distinctive characteristics associated with certain honeys. His written comments covering each line of honey are a valuable guide to the blender in his preparation of a palatable blend of honey uniform in flavour, colour, and moisture that will remain stable for a reasonable period at room temperatures.

It is surprising how narrow are the limits within which a blender must operate to produce a light-coloured blend of mild flavour. A light-coloured blend must consist mainly of light honeys, though a little dark honey can be used if the flavour is sufficiently mild. It is in the flavour that the danger lies. Dark honeys are as a rule strong or pronounced in flavour and a small quantity will impart its characteristic taste to the blend. Even light honeys with a distinctive penetrating flavour such as rata can be used only sparingly with clover honey if the delicate clover flavour is to be retained.

Small quantities of strong-flavoured honey used in a blend, and barely discernible when packed, frequently become more pronounced in time and tend to spoil the pack. Light amber blends should comprise all light amber honeys, as dark honeys are too costly in the quantity of white honey required to raise the colour points to the required standard.

The problem of maintaining a mild flavour has also to be considered. A blend of all dark honeys is not so difficult, as a medium flavour is expected in this type of pack, and when dark honeys are blended flavours even out and the pack is almost invariably superior to the individual honeys used.

Coarse-grained honeys present the blender with yet another problem that was mentioned earlier in this article.

Sometimes blending is made difficult by an unbalance of sugars in honey. Extremely coarse-grained honey is affected in this way and so are non-granulating honeys. Poor granulation in honey high in laevulose can be attributed to the slowness with which dextrose crystallises from solutions of high laevulose content. The application of heat and the addition of honey high in dextrose is the only satisfactory way to deal with these honeys.

Silk — Its Characteristics and its Care

By MAUD B. STRAIN, Home Science Instructor,
Department of Agriculture, Dunedin

PURE silk is a most desirable fabric because of its unique properties. It is soft and supple yet resilient, sheer but strong, warm though light in weight. Pure silk materials have been unprocurable for a long time and a generation has grown up unfamiliar with this beautiful fabric. It always has been, and may remain, a luxury fabric, but it is beginning to appear again in the shops and so it is advisable to know what to look for when buying it and how to care for it in use. Silks properly treated will give excellent wear and will retain their elegance for years.

THE only source of the silk fibre is a cocoon spun by the silkworm, a species of caterpillar. There are several species of silk-producing caterpillars, but the mulberry silkworm produces most of the commercial fibre and they have been artificially cultivated for centuries. There are other varieties of caterpillars which cannot be artificially cultivated and they produce the fibre known as wild silk.

When the caterpillar is fully grown it spins a cocoon round itself. If left alone, it would emerge after two weeks as a moth, but as this would mean that the cocoon would be ruptured and the great length of continuous filament reduced to lengths of a few inches, the cocoon is heated or steamed to kill the moth. After the moth inside has been dried the silk is unwound ("reeled"), the filament being 1,000 yd or more long. The filaments of several cocoons are then twisted together to form a thread ("thrown").

Silk fibre as reeled from cocoons still has a gummy coating and in its manufacture into fabric it goes through various processes during which the gum is removed, until with all the gum removed it becomes beautifully lustrous and luxuriantly soft. Silk foulard and the various wild silks still retain much of the gum on the fibre.

As well as the unbroken filament from undamaged cocoons, there are short filaments obtained from damaged cocoons and others which appear at various stages in the manufacture of silk. These short fibres are known as silk waste and are spun to produce threads in the same way as short fibres of cotton and wool are converted into threads. The thread spun in this way is known as spun silk.

Spun Silk

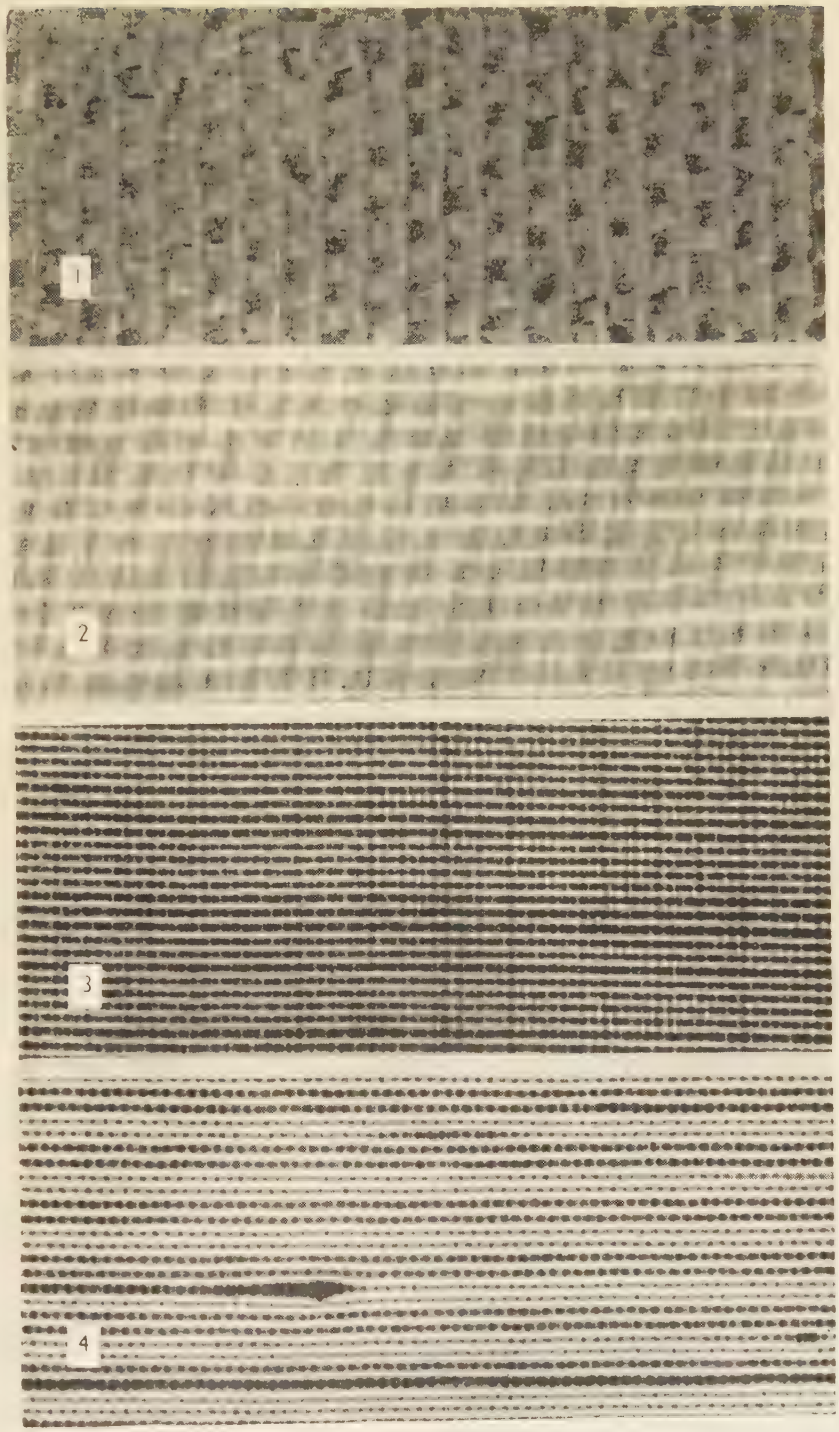
Spun silk is natural silk, but as it is made from short fibres, it has slightly less strength and elasticity and is not as lustrous as reeled silk, though it has the same general characteristics. It washes well and is a good summer dress material. It is also used for blending with other fibres, particularly wool when it increases the wear and decreases the shrinkage. Other uses are for trimmings, sewing silk, pile fabrics such as velvet, and umbrella coverings.

Wild Silk

Wild species of silkworm live on oak leaves. They produce a coarser, less regular filament which is tan in colour because of the tannin in the oak leaves. Wild silk does not take dyes as readily as the cultivated variety but it can be dyed satisfactorily in plain colours.

Fabric made from wild silk is very strong and has a crispness and handle that make it suitable for tailored coats and suits beside frocks and blouses. It washes well and is easy to iron, but it must be bone dry before ironing. If ironed damp, it has a papery feel because of the presence of the natural gum on the fibre.

CHARACTERISTICS OF SILK



These magnified views show the different weaves of various kinds of silk. 1—Pure silk crepe de Chine. The twisted threads produce the characteristic fine crinkled effect. 2—Pure silk satin. The long, floating, slanting threads give this material its highly lustrous surface. 3—Man-made rayon acetate shantung. 4—Natural silk poplin. The evenness of the threads of the man-made fibre contrasts with the characteristic unevenness of the natural silk fabric.

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The following plants are offered for sale to registered nurserymen and commercial berry fruit growers.

STRAWBERRY: Redgauntlet, Talisman, Merton Princess, Huxley.

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GOOSEBERRY: Levin Early.

Small nucleus stocks only are available and quantities to each purchaser are restricted as follows:

		Price
STRAWBERRY:	Initial order — 100 plants per variety	28/- per 100 plants
RASPBERRY:	Initial order — 100 plants per variety	50/- per 100 plants
GOOSEBERRY:	2-year-old plants, initial order — 12 plants	36/- per 12 plants
	Rooted cuttings, initial order — 25 plants	30/- per 25 plants

This year order forms are being sent out only in response to specific requests.

Nurserymen and berry fruit growers who require plants this year must apply to offices of the Department of Agriculture for order forms, which, with descriptions of plants for sale, will be available in March. Acceptance of orders closes in April 1960 and orders must be placed on the form supplied. Full instructions for ordering plants are given on the order form.

Orders and payment for plants must be sent to the District Executive Officer, Department of Agriculture, Palmerston North.

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NEW ZEALAND RAILWAYS

Shantung and tussore are both wild silks.

Properties of Silk

When silk fabric is well constructed it is very durable; its use for parachutes is the highest recommendation that could be given as to its strength.

It is smooth and lustrous because of the length and regular shape of the fibre, and it is elastic, being able to stretch about one quarter of its length without breaking. Because of its resilience, silk is crease-resistant; a silk handkerchief crushed to a ball in the palm of the hand will jump right out of the hand when released. Silk, like wool, is a non-conductor of heat and is warm in winter and cool in summer.

It is hygienic because its smooth surface does not attract dirt and any dirt that does gather is given up readily when the material is washed or dry-cleaned. All silks spot with water, but subsequent washing or dry-cleaning restores the appearance of the fabric.

Strong acids attack silk, but dilute acids have no effect. The peculiar crackling sound heard when silk is rubbed together or squeezed in the hand comes from the fibre being washed in a dilute acid bath and being dried without rinsing. It disappears after washing.

Strong alkalis such as caustic soda destroy silk. Strong soaps should not be used on silk because they may contain an alkali. Perspiration, being acid and salt, should be washed out immediately.

Other than under extreme conditions of dampness as may occur in tropical countries, silk is not subject to mildew, but should not be left damp for long periods. Normally it dries out before mildew has time to develop.

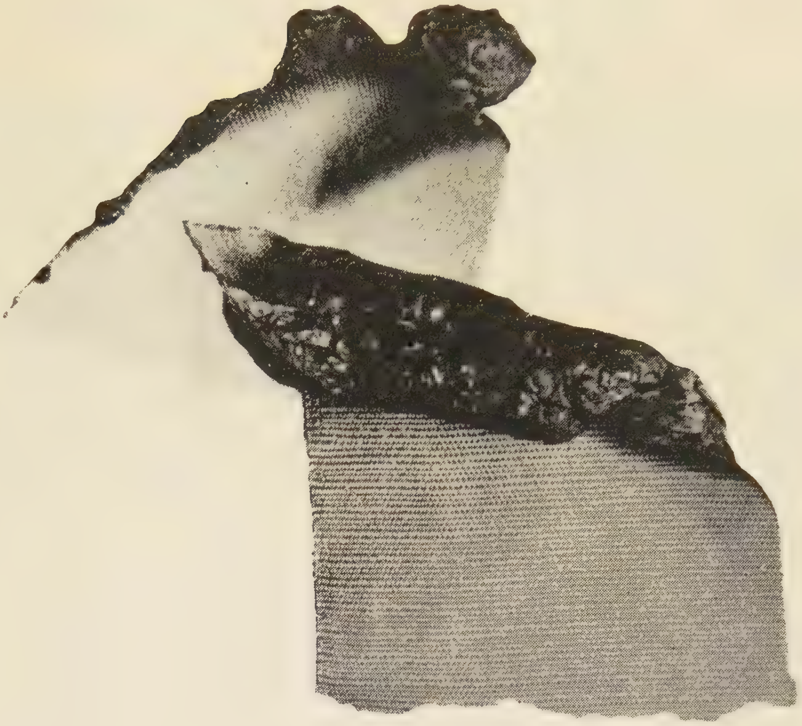
Silk takes dyes well and is especially suitable for printed designs. Dyed silk is colourfast under most conditions, but not to strong sunlight.

Silk fabrics are made in a great variety of weights and textures from fine, sheer chiffons, georgettes, and similar gossamer fabrics through all the intermediate weights and textures to heavy brocades and satins.

Weighting

As much as 25 per cent of the weight of raw silk is lost in the degumming process. To offset this loss metallic substances are sometimes added in the dyeing process to make up the weight. Weighted silk fabrics have become acceptable in the textile industry, but if excessive metallic salts are used in the weighting, they eventually weaken the fabric.

IDENTIFICATION OF SILK



Silk can be identified by the burning test. The ash on the pure silk (upper) appears as round, crisp, shiny black beads which crush easily between finger and thumb, while that on the weighted silk (lower) retains the shape of the material.

Weighted silk is less compactly woven than unweighted silk and less silk is used in the construction of the cloth; in other words weighting rather than compact construction gives firmness and body to the fabric.

A small amount of metallic weighting correctly applied to a fabric that is woven to hold it is not considered injurious. It lowers the cost, and gives the silk crispness, lustre, a firmer body and feel, and when the fabric is pleated it retains the crease. However, the natural elasticity of the silk fibre is lost and it is subject to deterioration when exposed to sunlight, perspiration, and dry-cleaning.

Taffeta is a fabric often heavily weighted and it will crack and split at places subjected to strain in wear or when folded for a long period. Rayon taffeta does not contain metallic weighting.

Identification

A rough way of identifying silk is by the burning test.

Pure silk burns slowly and ceases flaming when the fire is withdrawn. The ash appears in the form of round, crisp, shiny black beads that crush easily between finger and thumb. Acetate also leaves a black bead, but it is hard and brittle, and very difficult to crush. Also, acetate blazes as it burns.

Weighted silk burns without showing a visible flame. The burned part becomes incandescent, chars, and gradually smoulders away, leaving behind a skeleton of the original fabric.

Trade Description

It is necessary to understand the meaning of the various terms used to describe silk before one is able to judge the quality of a silk fabric.

"Silk" means the natural product of the silkworm. "All silk" may be applied to fabrics containing no other textile fibre, but an all silk fabric can contain weighting. "Pure silk" is used only where there is no metallic or other weighting except that which may be an essential part of dyeing. "Pure dye silk" indicates that there is no metallic weighting and the fabric is made exclusively of silk fibres. However, there still may be water-soluble substances such as starch, glue, sugar, or gelatine which may help to give firmness, but as these are removed at the first washing or cleaning, they have no detrimental effect on the silk fibre.

Well constructed pure dye silk requires a greater amount of silk

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thread than weighted silk because pure dye silk is usually more compact. Thus it is generally superior, having the qualities of elasticity and durability because the natural elasticity of the silk fibre has not been lessened and its great natural strength has been retained. "Nett silk" is a high-grade pure silk.

Silk fabric names, such as shantung, crepe de Chine, organza, if used to describe fabrics not made of silk, should always be qualified by the name of the fibre from which they are made, as cotton shantung, nylon organza, or rayon crepe de Chine.

Care of Silk

Silk is a strong fabric and will give long wear if treated carefully. Fabrics such as taffetas, brocades, and multicoloured prints should be dry-cleaned, not washed.

Silk should never be allowed to become very soiled before washing or dry-cleaning. Stains can often be removed by washing immediately in warm soapy water. If they have dried in, it is better to send the garment to be dry-cleaned rather than try to remove them chemically at home.

Perspiration quickly rots silk. Underarms of dresses and blouses should be protected against perspiration and if staining occurs, it should be washed as soon as possible. If it dries in the fabric, it is often impossible to remove.

Silk garments should not be put away for any length of time without being washed or dry-cleaned. Moths will eat dirt off silk and damage it in the process, but they will not attack the clean material.

All kinds of silk can be ironed to smooth out wrinkles, but the iron must be cool.

Laundering

Before washing silk articles test for colour fastness. Wet a small piece of fabric in tepid water. Take a piece of white material and place it over the fabric and press with a warm iron. If no colour comes off on to the white material the silk fabric is colour fast and thus washable.

If there are no scraps of material to test, wet a piece of white material and place it on an inconspicuous place on the silk, such as on the seam allowance inside the skirt, and press with a warm iron. If any colour comes off on the white material the silk is not washable.

The construction of a garment and any trimmings on it must be considered before deciding to wash it.

Silk should not be washed in hot water and it must not be soaked or boiled. As it does not hold dirt strongly, it should be washed by kneading and squeezing in warm soapy water. Use good-quality soap flakes and avoid strong bar soaps. Soiled parts such as collars and cuffs should be laid on one hand and rubbed gently with the other, using extra soap flakes if necessary.

It is more satisfactory to wash silk articles by hand, but if they must be washed in a machine, they should first be put in a bag made of some loosely woven material. Silk should be rinsed twice in cool water, then rolled in a towel and the excess water patted out. It should never be twisted and it should not go through the wringer. It can be put out to dry in an airy place away from the sun or any direct heat.

Silk should be ironed on the wrong side with a warm iron when slightly damp; if dried and re-damped it will look patchy. Shantung, tussore, and other wild silks are ironed when bone dry. Crepe weaves always contract when wet, but may be eased back into shape during ironing. They should be ironed on the wrong side when slightly, but evenly damp.

Hazel Nut Cake

THIS is an unusual recipe for a delicious, very rich cake made from finely ground hazel nuts. No flour or butter is used, as the nut meat is rich in starch and oil.

I first encountered this cake in Vienna and after may years of searching was given the recipe by a friend who grows hazel nuts in her garden near Nelson.

In Vienna this cake is served as a torte lavishly decorated with sweetened whipped cream to be eaten with coffee which is also topped with whipped cream. This would be too rich for most people and a forbidden delight for waistline watchers. (A torte consists of three or four ½ to 1 in. layers of cake filled with thick, sweetened cornflour custard often flavoured with kirsch or some other liqueur. The top of the torte is decorated with piped whipped cream.)

As a compromise serve the cake as a dessert with whipped cream and sliced fresh fruit or plain with coffee.

The illustration gives an indication of the size of the cake made from the following recipe. It was baked in a 9 in. sponge tin.

Hazel Nut Cake

¾ lb of hazel nuts
4 eggs
6 oz of sugar
1 teaspoon of baking powder

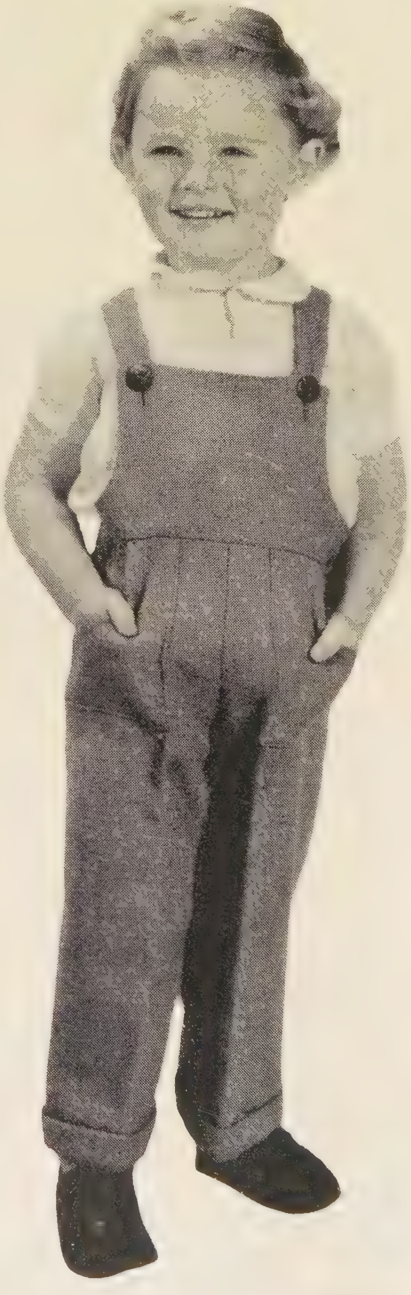
Shell the nuts and mince the kernels very finely. Some oil will drip from the mincer and this should be saved unless it is very discoloured.

Sift the baking powder, then beat the eggs until they are thick and creamy. Gradually beat in the sugar and fold in the ground hazel nuts, oil, and baking powder. Pour into a lightly oiled sponge tin and bake in a moderate oven (375 degrees F) for ¾ to 1 hour.

—*BETTY M. JOHNSTON,*
Home Science Instructor,
Department of Agriculture,
Wellington

Warm Winter Overalls for Children

By MAUD B. STRAIN,
Home Science Instructor,
Department of Agriculture,
Dunedin



[Hurst and Palmer

IN winter small children need to be protected from the cold, but whether they are warm enough or not does not concern them when they are absorbed in their play. Perhaps the most sensible wear is a warm cardigan or lumberjacket with a snug-fitting neck line, and warm overalls reaching to the ankles. The overalls illustrated here are simple to make and easy to wear.

THE pattern given will fit a child three to four years old. The measurements of the completed garment are: Waist, 26 in. pulled in to 22 in. with elastic which gathers the back only; waist to crutch in front, 10 in.; inside leg seam, 13½ in.

Making the Pattern

A paper pattern can be made by following the diagrams on the opposite page. Each square in the graphs represents 1 in. except in the larger trouser pattern, where each square represents 2 in.

To enlarge the pattern pieces to their original size use the scale patterns as a guide and draw the pieces out on to paper ruled into 1 in. squares for the bib and pocket and 2 in. squares for the trousers.

No patterns are given for the shoulder straps or for the casing for the elastic at the waist. For the straps cut two straight pieces each 20 in. long by 3 in. wide, and the casing is a piece of lining material 18 in. long by 2¼ in. wide cut on the bias.

Materials

The overalls in the illustration were cut from ¾ yd of 59 in. all-wool material, but they could equally well be made up from a woman's discarded winter skirt. Corduroy is also suitable, as it is warm, hard wearing, and easily washed, but as it is only 36 in. wide, 1½ yd would be needed.

Other materials required are a small piece of lining material (sateen or other fabric), suitable for lining the bib and making the casing, 12 in. of 1 in. wide elastic, two medium size buttons.

Cutting out

When laying the pattern pieces on the material be careful to make sure that the arrows lie on the lengthwise grain of the material or the garment will not set correctly or keep its shape. Double width material cuts better.

Trouser: Cut two (making sure to have a right and left leg).

Bib: Cut one. Place on lengthwise fold of material. Cut one in the lining material also.

Pocket: Cut two (right and left side).

Shoulder straps: Cut two straight pieces, 20 in. long and 3 in. wide.

Casing: From the lining material cut a bias strip 18 in. long and 2¼ in. wide.

To Make up

Rough edges should be oversown or pinked to prevent fraying.

Pockets

Turn ½ in. hem round the edges of both pockets, making sure there is a right and left pocket.

The curved edge of the pockets can be faced with bias binding. Open out one edge of the bias binding and place it on the curved edge of the pocket, right sides together. Machine ¼ in. below the raw edges, then press the binding over to the wrong side of the pocket and machine stitch it.

If the curved edge is not faced, turn under a narrow edge with the machine.

Tack or pin the pockets in place with the long edge of the pocket along the straight grain of the trousers 2 in. from the centre front and the top at the waist line, and machine stitch.

Trousers

Join the seams of each leg. Make sure there is a left and a right leg.

Place the leg seams together at the crutch and join the front and back seams. Press the seams open.

Shoulder Straps

Join the long edges of the shoulder straps and turn them right side out. As the shoulder straps cross over at the back, cut the back ends at an angle and tack them in place 1½ in. on each side of the back seam of the trousers with the shorter side toward the seam.

Bib

Stitch the lining to the bib round the sides and top with right sides together, leaving 1 in. free at the bottom of each side. Turn right way out and press well.

Leaving the lining free, join the bib to the front of the trousers with the centre seam of the trousers exactly at the centre of the bib, right sides together, and stitch ½ in. below the raw edges. Turn up ½ in. on the bottom of the bib lining, then hand sew this to the trousers on the inside, covering the raw edges.

Each square in the graphs represents 1 in. except in the trouser pattern where each square represents 2 in. To enlarge the pattern to its original size use these scale patterns as a guide and draw the pieces out on to paper ruled into 1 in. squares for the bib and pocket and 2 in. squares for the trousers. →

Casing

Attach the casing on the right side of the trousers. Leave 1 in. of casing free and start machining at the point where the bib is joined on, take it round the back, and finish, leaving 1 in. free at the other side of the bib. Turn the casing to the inside of the trousers, press, turn up a ½ in. hem, and machine in place.

Make a ½ in. hem on each of the free ends of the casing and hand stitch the free ends with the top edge to the bib lining and the bottom edge to the material of the trousers. This overlap makes a firm join which is necessary, as the elastic exerts a strong pull at these points. Thread the elastic through the casing and secure both ends firmly.

Make a buttonhole on the lengthwise grain of the material in each corner of the top of the bib.

Fitting

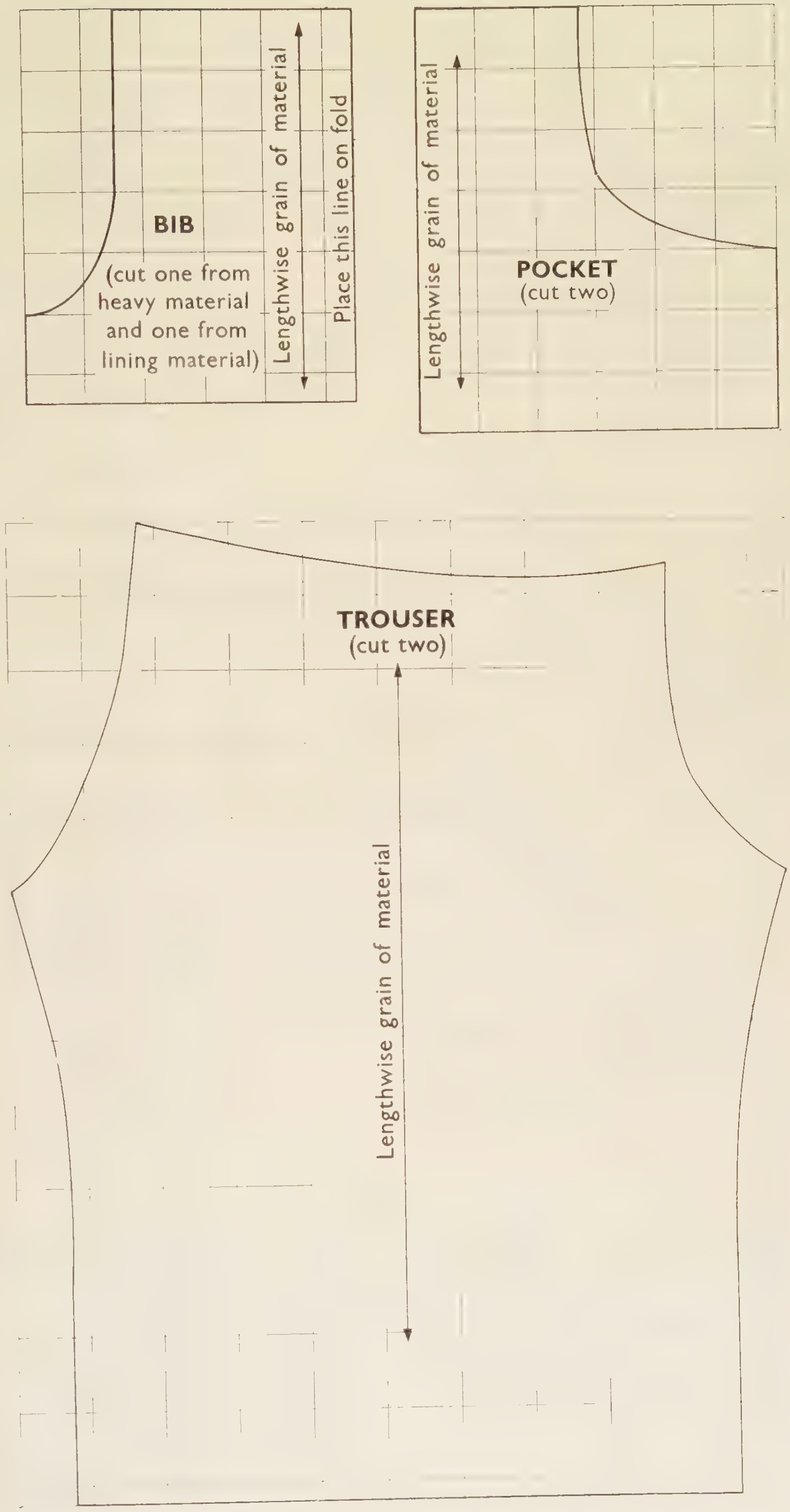
Try the overalls on the child. Adjust the length of the shoulder straps so that the crutch is comfortable and mark the positions of the buttons.

Adjust the length of the legs. The pattern allows a 2 in. hem and this is doubled back to give a 1 in. turn-up cuff. If a cuff is not desired, cut the trouser leg shorter.

Finishing

Sew the buttons on the shoulder straps. Steam press the whole garment.

PATTERN PIECES FOR OVERALLS


BIB
(cut one from heavy material and one from lining material)
Lengthwise grain of material
Place this line on fold
POCKET
(cut two)
Lengthwise grain of material
TROUSER
(cut two)
Lengthwise grain of material

Growing Calceolarias

By J. B. LAURENSON,

Horticultural Inspector, Department of Agriculture,
Palmerston North

[Green and Hahn

ENTHUSIASTIC gardeners are always on the lookout for something new to grow. Calceolarias, though a very old flower, have again come into popularity in recent years, and when seen for the first time create great interest, many people taking them to be a new introduction.

CALCEOLARIAS were originally found in Mexico and in the Andes of Chile and Peru, but two native species have also been found in New Zealand. With these latter, however, the flower formation is different, both upper and lower lips being inflated, whereas in all the other species the lower lip only is in the form of a pouch, which gives the flower the common name of "slipper" or "pouch flower". The name is derived from the Latin calceolus—a slipper.

Two Types

Botanically, calceolarias are related to the antirrhinum or snapdragon family and are of two kinds—the shrubby and the herbaceous. The shrubby types are well known for their bright display over a long period during summer of lemon yellow or varying shades of brownish-red flowers on shrubs seldom more than 18 in. or 2 ft in height. According to overseas publications new colours are being developed in this type.

Propagation is by semi-hardwood cuttings, and when rooted the tips should be nipped out to make a bushy plant. After flowering, if the growth is trimmed back, the bush will remain compact with fresh, young shoots.

The herbaceous kinds, though suitable for growing outside in sheltered, warm situations, are grown mainly in unheated glasshouses and glassed-in verandas. Here again the colours originally were either plain yellows and reds or spotted, but in recent years some interesting new colours have been developed. These now include white, cream, yellow, bronze, purple, red, and pink, either in selfs or in attractive combinations of colours. The heights of the plants vary from 9 to 18 in. and the individual blooms may be well over an inch across.

This type may be propagated from side shoots rooted in sand or the old plants can be cut back after flowering and wintered in frames or in a sunny situation in the glasshouse, to flower again another season. These methods are used only when it is desired to propagate some particular variety or colour. The usual method is to grow new plants from seed each year, and this can be done quite readily, giving the added interest of having colours different from those of the previous season.

The seed, which is very fine, should be sown in a glasshouse in January or February on the surface of a pot of sterilised light soil and covered with a pinch of sand. It may also be sown on sphagnum moss which has been rubbed through a ¼ in. sieve. The pot should stand in water until the moisture appears on the surface and after removal be covered with a sheet of glass shaded with paper or a handful of sphagnum moss.

The pot should be kept moderately moist in a cool, shady position in the glasshouse until the seed has germinated, usually in about 10 days to a fortnight. When the second leaves appear the seedlings may be pricked out 2 in. apart in seedling boxes and later potted up in 3 in. pots and progressively into larger sizes up to 6 in. or 7 in., in which they are left to flower. The weakest seedlings are sometimes the best colours, the strong ones often being the more common yellow shades.

Potting Method

The potting soil should be a coarse, open mixture composed of fibrous loam, well decayed cow or horse manure, leaf mould, old mortar rubble, and sharp sand all passed through a 1 in. sieve. The plants should be potted loosely to allow a free root run.

Watering should be done sparingly in the cold weather, but at no time should the plants become too dry. Calceolarias respond to liquid feeding. When established in the second-size pots a watering with ½ oz of superphosphate in 1 gallon and a week later with ½ oz of sulphate of ammonia in 1 gallon will be found beneficial. In the final pots a dressing of four parts by weight of superphosphate, one part of sulphate of ammonia, and one part of sulphate of potash—each plant receiving sufficient to cover a sixpence once a week—will produce sturdy plants. Occasional watering with liquid manure from the time the buds form until flowering will improve the quality of the flowers. Between liquid feeds the plants should be watered with clear rain water which, in glasshouse culture, should always be used in preference to tap water.

Pest and Disease Control

The main cause of failure in growing calceolarias is their susceptibility to attack by aphids, which usually show up on these before they appear on other glasshouse plants. To prevent this the house should be kept well ventilated and extremes of temperatures avoided. Fumigation with nicotine sulphate or other suitable insecticide smoke generators, burning household lindane-treated fly papers, or the use of plant aerosol insecticides (not the household fly sprays) every three weeks will keep the house free of these insect pests; these methods are preferable to the use of liquid sprays, which are liable to bring about botrytis or grey mould on account of excessive moisture on the foliage. Botrytis can be controlled by dusting with thiram. The glasshouse should be well shaded, as calceolarias will not stand the full sun.

As the flower stems grow they should be supported with thin stakes to prevent them from falling over when the flower trusses are fully developed.

The grower will be well rewarded with a display of bloom for several weeks in October and November at a time when there is usually a gap between the spring display of cyclamen, cinerarias, and primulas and the later begonias and gloxinias.

C. mathotiana

C. reticulata

[Elliott

Lady Clare

Flower Garden

Camellias

By J. S. SAY,
Horticulturist, Department of Agriculture,
Auckland.

CAMELLIAS were among the first ornamental plants introduced by the early settlers and many specimens which have now assumed tree-like proportions may still be seen on the sites of old homesteads. As in other parts of the world they lost favour and for many years few were planted in New Zealand gardens. Today, with the introduction of new species, varieties, and hybrids, they have returned to a place high in the list of the most popular garden plants.

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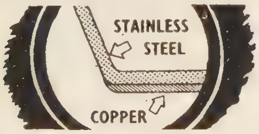

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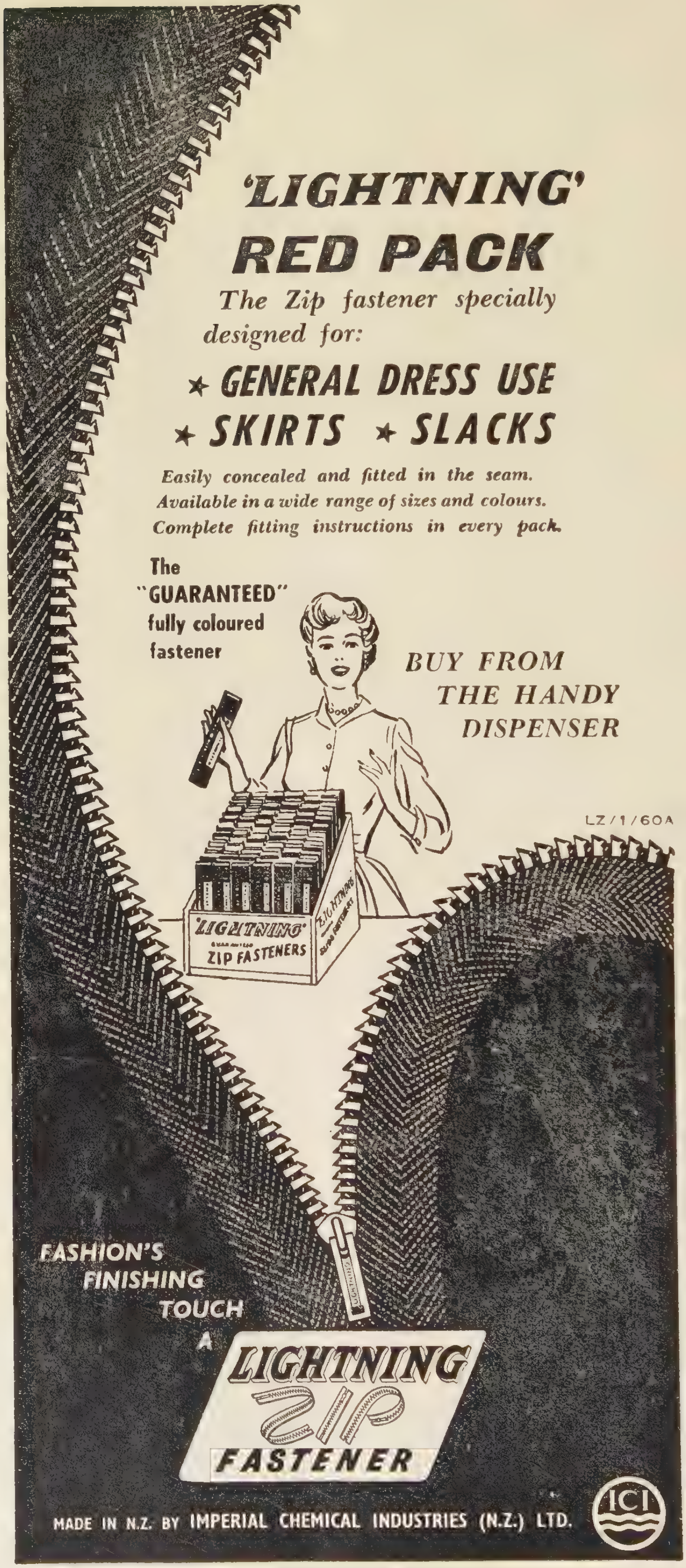

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ICI

UNTIL a few years ago when a gardener spoke of camellias, *C. japonica* and its varieties were referred to, for other kinds were not generally available. Now, in addition to innumerable new varieties of *C. japonica*, there are two other large groups, *C. sasanqua* and *C. reticulata*, as well as a few other species and hybrids.

C. japonica

C. japonica has large, dark green shiny leaves and the flowering season extends from late winter until late September according to variety. One of the faults with older varieties was their habit of holding the flowers long after they had faded. Most of the newer varieties are "self-grooming". They drop their flowers so that the bushes never look untidy. Flowers vary considerably in shape and for descriptive and show purposes have been divided into six types:

Single: One row of not more than eight petals; example, Spencer's Pink.

Semi-double: Two or more rows of petals and conspicuous stamens; examples, Lady Clare, The Czar (Adolphe Audusson).

Anemone form: A flat flower with one or more rows of large outer petals, the centre a convex mass of small petaloids (petal-like structures) and stamens intermingled; example, Anemonaeflora (Red Waratah).

Peony form: A deep, rounded flower with several rows of outer petals, the centre a convex mass of long twisted petals and petaloids with some stamens; examples, Lady Loch (Duchess of York), Debutante.

Rose form: Several rows of overlapping petals, opening in a rose bud form but showing stamens, which may be small, in a concave centre when fully open; examples, Purity, Mathotiana (the true form).

Formal double: Fully overlapping, many rows of petals becoming smaller toward the centre, never showing stamens; example *C. alba plena.*

The naming of *C. japonica* varieties is very confused, some being known by several names. A great deal of research work is being done in Great Britain, U.S.A., Australia, and New Zealand, and it is hoped that a check list giving correct names will be published before long. The recently formed New Zealand Camellia Society has already done much to sort out and name correctly varieties in this country. Many New Zealand nurserymen are adopting the correct names, giving the incorrect ones in brackets.

C. sasanqua

C. sasanqua has much smaller leaves and flowers. The flowering season extends from late autumn to early spring.

[*Elliott*

The Czar, a large semi-double red with conspicuous golden stamens.

C. reticulata

C. reticulata is generally considered the most beautiful of all camellias. As yet new varieties are mainly in the hands of specialist growers in New Zealand, for they are very costly, being in short supply and difficult to propagate. The flowers are large and vary from semi-double to double and from pale pink to bright red. The petals have a sheen which makes the colours glow. The leaves are covered with a network of veins, hence its specific name, *reticulata*.

Hybridists are now crossing varieties of *C. japonica*, *C. reticulata*, and a number of other species to give some outstanding hybrids, a number of which have been raised in New Zealand.

Soil

Camellias are not difficult to grow, though they demand suitable soil conditions. The essentials are a cool, moist, slightly acid soil with plenty of organic matter and perfect drainage. Where these conditions do not exist naturally, they can usually be provided. Well rotted animal manures, compost, leaf mould, or peat dug into the beds when they are being prepared will assist drainage on heavy soils and help to retain moisture on light soils. Blood and bone may be worked into the soil at the same time. Lime and ashes should not be used.

Position

C. japonica varieties do best in semi-shade, the most suitable being dappled shade from trees. In districts with severe frosts a position where they do not get full sun early in the morning is desirable. Sasanquas and reticulatas will stand more open and sunny positions, but very hot places such as against a wall facing north are unsuitable. Exposure to strong winds is

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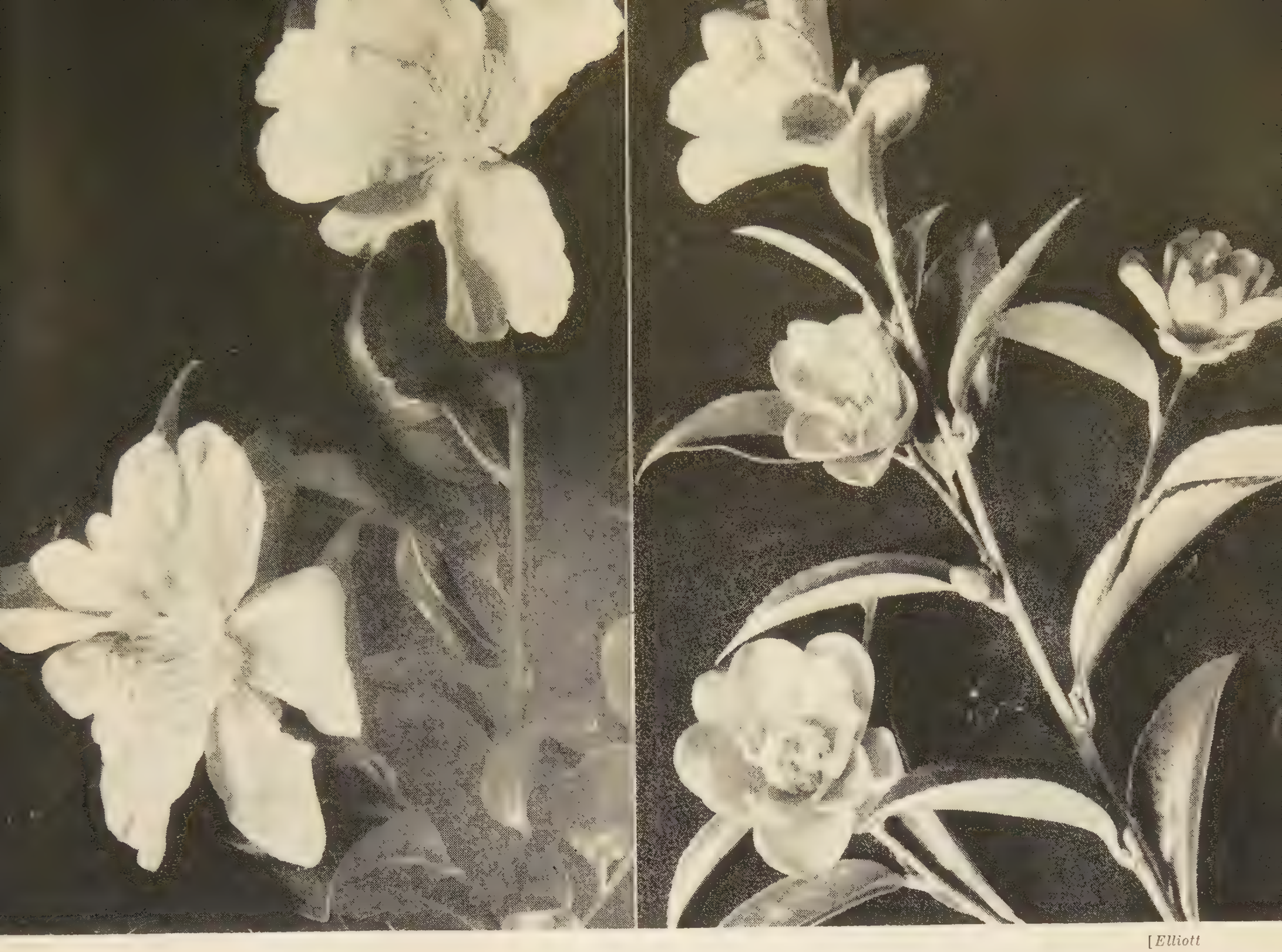


[Elliott

Two forms of *Camellia sasanqua*, Monozono (left) and Hiryu (right).

not good as the flowers damage easily. Camellias can be grown near the sea provided soil conditions are right, as they will stand salt winds.

Planting

Planting positions should be prepared well in advance to allow the soil to settle down and be suitable for the plants when they arrive from the nursery.

Most camellias are sold as small pot-grown plants during late winter and early spring. After removal of the plants from the pots the old drainage material should be removed and the roots gently loosened if they are matted round the outside of the ball of soil. Care must be taken that they do not dry out after planting. This is especially important for the first year or two until they are thoroughly established.

Maintenance

It has already been mentioned that one of the main requirements is a cool, moist root run. One of the best ways to maintain this condition is by mulching. Coarse sawdust or wood shavings are excellent. They must be from untreated timber. Pine needles are favoured by many growers, but lawn clippings, compost, and animal manures are generally considered unsuitable. Low growing annuals such as violas and phlox may also be used.

If the position has been well prepared before planting, fertilisers should not be needed for the first two or three years and later little should be required unless the soil is poor. Blood and bone may be applied in early spring and, if necessary, sulphate of ammonia or dried blood can be given in November. As camellias are not gross feeders, fertilisers should be used sparingly.

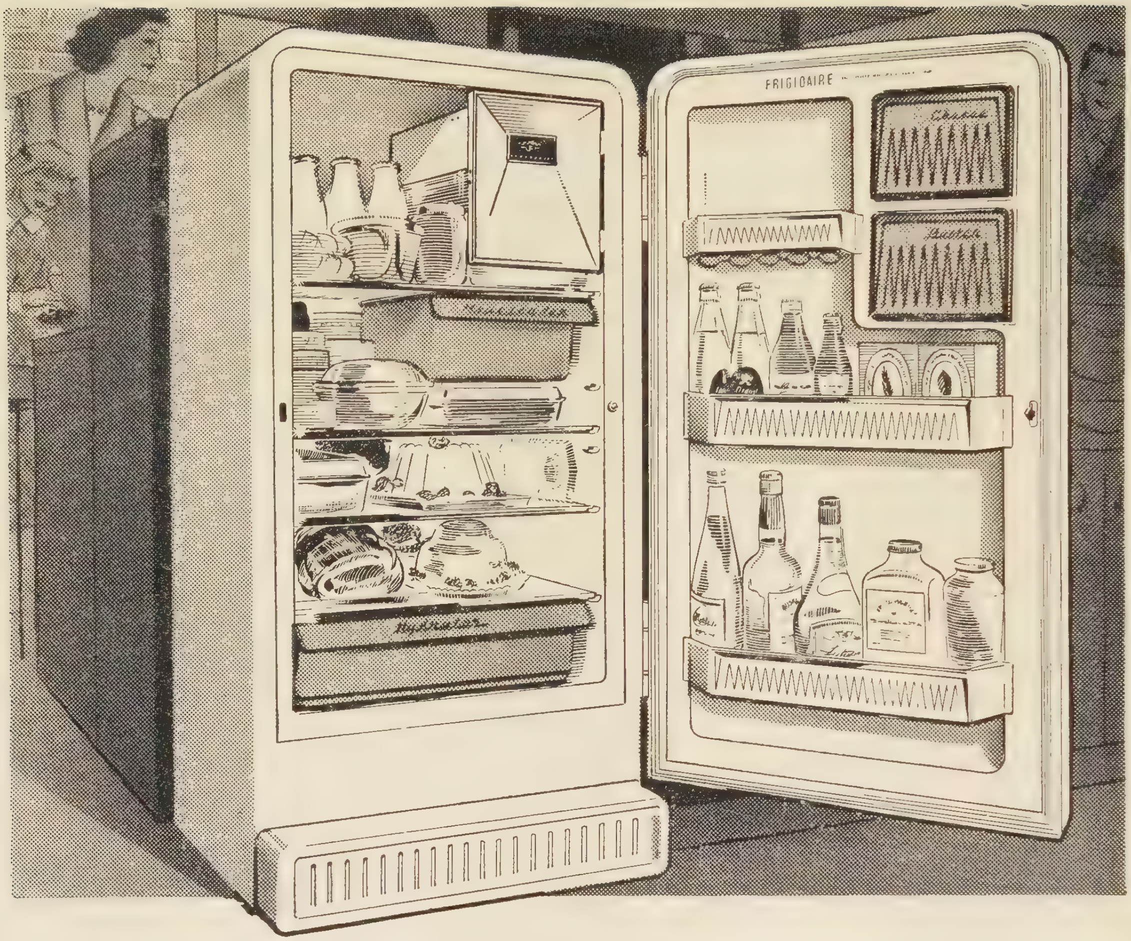
Pruning

The appearance of many camellias is spoilt by pruning them too severely and by clipping them with hedge shears. A dense compact bush is formed with small flowers or short stems. Camellias always look better if allowed to grow naturally, but if pruning is necessary to keep the plants within bounds, it should be done carefully with secateurs, shortening back some growths and removing others from below the general outline of the plant so that the new growth has room to develop without becoming too dense. The best time to prune is in spring just before growth starts.

It is inadvisable to prune reticulatas, as they do not break into new growth as freely as other kinds. They should not be cut back into hard, leafless wood should pruning become necessary.

Uses in the Garden

In addition to the normal use in shrub borders, mixed flower borders, and as specimens, camellias can be used in other ways. *C. sasanqua* types make a very good hedge. They may be allowed to grow naturally to make an informal hedge or they can be lightly trimmed to a more formal shape. It is best to use one variety or several with similar growth habits rather than a mixed lot with different habits.



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They make good tub plants which are attractive even when not in flower. Sasanquas may be trained flat against a wall or trellis and will give colour at a time when few climbing plants are in flower.

Propagation

Many camellias may be propagated fairly easily by cuttings, but others are difficult and, with *C. reticulata*, almost impossible. The most suitable material for cuttings is the current season's growth soon after it has become firm. It is usually in a suitable condition from mid summer until late autumn. The cuttings are usually made about 6 in. long and may be planted in a cool, moist, shady position in the open or put in a pot in a glasshouse or frame, which should be well shaded. Equal parts of coarse sand and soil or sand and peat are good rooting media. The method of rooting cuttings in pots or boxes enclosed in polythene bags, which was described in the September 1958 issue of the "Journal", is excellent for camellias.

Grafting

Camellias which are difficult to propagate by cuttings are usually grafted on to stock grown from seed or cuttings. New varieties may be grafted on to established plants which have no particular merit. Grafting is not difficult and a large plant will be obtained in a fraction of the time required to grow one from a cutting.

The plant is usually decapitated at a point where the main stem or branches are not more than 1½ to 2 in. in diameter, but grafting can be done on much thicker wood. The cuts should be made with a saw and then trimmed cleanly with a sharp knife. The easiest method of grafting is a simple cleft graft. It can be done at almost any time of the year, but spring or late autumn is best, as the scion wood is usually in a suitable condition. It should be mature, but not too old and hard.

The scions are cut about 6 in. long with three leaves above the wedge. A sharp knife should be used to trim the base of the scion to a wedge about 1½ in. long, with one side thicker than the other, so that it will fit more closely into the cleft in the stock.

The cleft is a simple cut made with a sharp knife to a depth a little more than the length of the wedge. On a thin stock it can be held open with the fingers while the scion is inserted, but on a thick one it may be necessary to use a wedge of some kind. The cambium layers (the actively growing tissue just below the bark) should match. The scion should be held in place by binding with raffia and a little slightly damp sphagnum moss may be tied round the scion. A polythene bag can then be placed right over the graft and tied below the cut. Where the grafting has been done close to the ground the soil may be drawn up over the union and a glass jar or polythene bag placed over it. The plants must be protected from direct sun.

Callus growth at the union will show when the graft has taken. This usually takes about two months. Ventilation can then be given by loosening the tie or by making a cut in the bag. After three or four weeks the bag may be removed, but it is advisable to shade it for another few weeks. Protection from strong wind is also important, as the graft may blow out.

Pests and Diseases

Diseases of camellias are practically unknown and as a rule attacks by insect pests are not serious. Scales, whose presence is usually shown by the black sooty mould which grows on the honey dew they excrete, can readily be controlled by spraying with white oil in summer and autumn. DDT or malathion is satisfactory for leaf roller caterpillar. The latter may also be used for scales. DDT or lindane should be used if brown beetles cause damage to the leaves. All sprays (except the oil) should be in the form of wettable powders, as emulsions sometimes cause damage to young growths.

Yellowing and Mottling of Leaves

Chlorosis (yellowing) and a mottling of the leaves may be caused by a virus disease or a number of physiological troubles. Exposure to strong sun, especially in spring when the growth is soft, will cause bleaching. Sunburn may also occur in hot, dry areas which are in general unsuitable for the cultivation of camellias. Poor drainage and a very acid or a very alkaline soil are other causes of chlorosis.

Some of these leaf symptoms are very similar to those of virus infection. On the petals virus causes a blotching which should not be confused with the regular striping of some varieties. White varieties do not show petal symptoms. There is no cure for virus, but as a rule it does not have a very great depressing effect on growth. It is not advisable to propagate from infected plants.

Raising Healthy Stock Seedlings

DURING the past year, growers of stock seedlings for cut flowers or for garden decoration have suffered losses from the disease downy mildew (*Peronospora matthiolae*). The disease is not carried on the seed, but the spores attack the seedlings as soon as they germinate.

Officers of the Horticulture Division of the Department of Agriculture and of the Plant Diseases Division, Department of Scientific and Industrial Research, state that the plants can be protected from infection by spraying them with the following materials.

Spray Programme

(a) As soon as the seed has germinated and again one week later spray with:

Streptomycin	1 pack*
Glycerine	1½ fl oz.
Spreader	a few drops
Water	1 gallon

* Streptomycin is sold in bottles to add normally to 5 gallons of water; in this instance, 1 bottle is added to 1 gallon of water.

(b) After pricking out and at weekly intervals spray with

Zineb	1 oz
Water	6 pints

Important Points

Important points to note are that the first spray with streptomycin is applied as soon as the seed germinates and that only one other application of this material is given. If more is applied, the plants will be stunted.

Care should be taken that all sprays reach the stem and undersides of the leaves; so spraying should be carried out using a fine nozzle and keeping this at soil level.

By the time the seedlings have produced 6 to 8 true leaves they become less susceptible to the disease, and they will then grow and flower normally.

—*J. P. SALINGER,*

Horticultural Advisory Officer (Ornamentals),

Department of Agriculture,

Wellington

Work for April

Autumn Colour

As the weather becomes colder autumn tints will appear on the leaves of deciduous trees and shrubs. Virginia creeper and persimmon are reliable in this way throughout New Zealand. In the Auckland Province liquid ambar, stag's-horn sumach, and smoke bush (*Rhus cotinoides*) are usually also vividly coloured. Further south there is a wide choice of plants with coloured foliage including those already mentioned and cornus, maidenhair tree, parrotia, viburnum, azalea, cherry, nandina, peony, acer, and liriodendron.

By JOY WATKINS,
Horticultural Advisory Officer,
Department of Agriculture,
Auckland

Nerines

Nerines, lovely autumn-flowering bulbs, flower freely if left undisturbed, and the flowers last well when cut. A well drained soil is desirable to avoid rotting of the bulbs, and deep volcanic soils appear to be particularly suitable. A sunny position against the north side of a house is good, as it ensures ripening of the bulbs. Bulbs should be planted so that the necks are out of the ground. Nerines can also be grown in pots.

The common *Nerine bowdeni* is a rather hard pink, more modern varieties are in soft shades of pink, red, or white. Seed can be sown as soon as it is ripe in autumn, and it will flower in about four years.

Zauschneria californica, Californian fuchsia, is a prostrate autumn-flowering shrub which is completely hardy and ideal for banks, rock gardens, or dry walls. The brilliant orange-scarlet flowers are carried in profusion at a time when few shrubs are in bloom, and they show up well against the grey-green foliage. Cuttings can be taken in spring, or the plants can be lifted and divided during winter. A sunny position and a poor soil are preferable for this plant.

Slugs

Slugs can do considerable damage to plants and bulbs during winter and should be eradicated. Baits of bran and metaldehyde or proprietary slug baits can be used and should be protected from rain by a flower pot or half drain pipe. Slug killers now obtainable which can be diluted with water and watered on to the soil are most effective, especially among seedlings and herbaceous plants. A layer of scoria, weathered ashes, or similar sharp material can be placed round particularly susceptible plants, for example, delphiniums, as slugs and snails dislike crawling across this.

House Plants

African violets should be showing flower buds now. A virus disease which it is impossible to control causes numerous small distorted leaves and few flowers. Any plants showing these symptoms should be destroyed to prevent the spread of disease to healthy plants. Leaf cuttings should not be taken from such plants. Grey mould appears particularly under cold, damp conditions and causes the rotting of flower buds and leaves. Remove and burn affected parts and water less frequently.

During winter African violets should be placed where the temperature is fairly even and does not drop below 50 degrees F at night.

Glasshouse

A fresh atmosphere in the glasshouse should be maintained. Ventilation should be given during warm, sunny days, closing down early to trap the sun heat. Some form of heating at night is essential to keep out frost and to prevent such diseases as botrytis and mildew which increase rapidly under cold, damp conditions. Kerosene heaters are economical and efficient, and some are designed for glasshouses.

Remove any dead or diseased leaves and flowers, and spray plants with a fungicide such as zineb or thiram which leaves no obvious deposits on these decorative plants. Zineb is used at 1½ oz and thiram 50 per cent wettable powder at 1¼ oz in 4 gallons of water. Water in the morning so that it has evaporated by evening.

Lower temperatures and shorter days will cause coleus to drop their leaves. Such plants can be nursed through winter to provide cuttings in spring.

Cuttings of pelargoniums and a few other plants can still be taken.

Planting and Propagating

Spring-flowering perennials such as polyanthus, trollius, arctotis, and pyrethrum should be moved to their flowering positions now, large clumps being divided. Bedding plants for winter and early spring flowering should be planted as soon as possible and watered in if the soil is dry. They include wallflower, calendula, myosotis, Iceland poppy, winter-flowering pansies, antirrhinum, nemesia, and stock. The last three are not suitable where hard frosts are common and are best planted in spring for summer flowering.

Cuttings of many deciduous shrubs such as ribes, forsythia, and buddleia can be taken as soon as the leaves begin to fall. Firm, well ripened stems of current season's growth should be selected; they should be cut into 6 to 9 in. lengths after the soft tips are removed. The cuttings can be inserted to about half their length in a light, well drained soil in the open ground. If the soil is heavy, leaf mould and coarse river sand or scoria can be worked in first to lighten it. Firm the cuttings in well.

Compost

There is usually plenty of waste material in the garden at this time which can be turned into good compost. Leaves of deciduous trees and shrubs can be kept in a separate heap to form leaf mould. This is invaluable as a mulch for many shrubs, as it is comparatively free of weed seeds.

Compost can be made from the material available when herbaceous plants are cut down and summer bedding plants cleared, hedges trimmed, and lawns cut.

Animal manure or a proprietary accelerator should be spread over the surface every 9 in. or so as the heap is built up. Another method is to sprinkle alternate layers with sulphate of ammonia and lime. These materials must not be applied together. If the material is dry, it should be watered as work proceeds.

Unless these precautions are taken, a compost heap will not heat up adequately during autumn and winter and weed seeds will not be killed. This can be a great drawback to the use of compost in the garden. When well made compost can be used freely as a mulch or worked into the surface layers of soil.

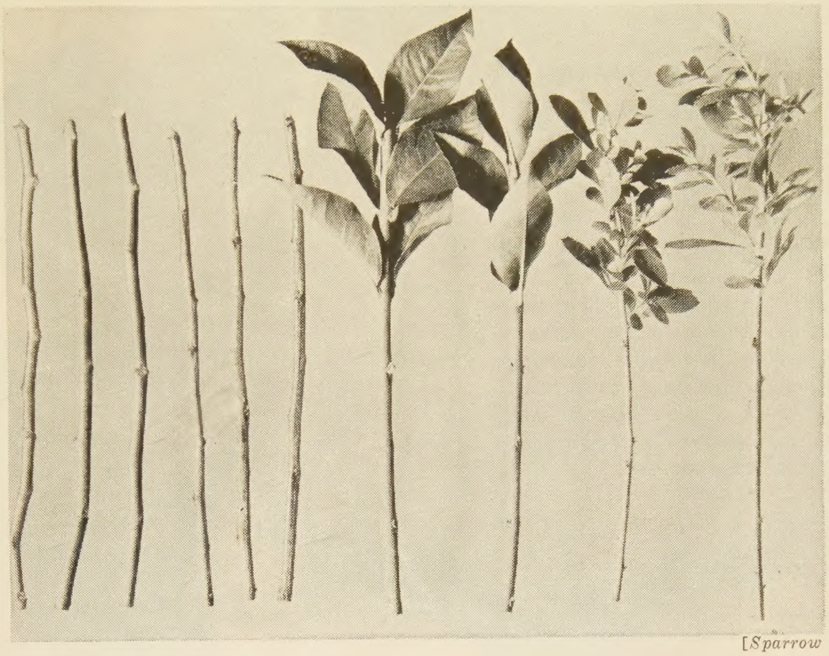
Check the staking of trees and shrubs, particularly those with shallow root systems such as acacia, cassia, and many Australian shrubs, also the long stems of poinsettia and luculia, which are easily broken off in high winds. Old nylon stockings make soft, secure ties which last about two years and do not cut into the bark.

With the first autumn rains, drainage should be checked. If water lies about in any part of the garden, old drains should be cleaned out or new ones dug. Many trees and shrubs are killed as a result of waterlogging during winter and early spring. They may appear normal in spring and begin to grow until the hot, dry summer weather comes, when they collapse because they lack healthy roots to supply water to the large leaf area.

Diseases such as fusarium and phytophthora which invade the dying roots may accelerate the death of the plant. When a plant dies in this way the ground should be treated with a fungicide such as copper oxychloride at 1 lb to 5 square yards before replanting. This substance can be spread dry and cultivated into the topsoil, or it can be dissolved in water and watered in. It does not harm any growing plants in the vicinity.

Green Manuring

Green manuring is a cheap method of increasing the organic content of the soil. On heavy soils this bulky material will improve the drainage, while in light, sandy soil the humus which results from green manuring helps to hold moisture and fertilisers. Blue lupins are possibly the best for sowing now in home gardens, but ryecorn and ryegrass can also be grown. The longer any of these are left to grow before turning in, as long as they do not become woody, the more bulk of material will be available. Rotting is usually accelerated by dusting with sulphate of ammonia or an animal manure before the crop is turned in. A complete fertiliser should be applied at 4 oz to the square yard before sowing or planting the next crop, as a green manure crop is grown primarily to improve the physical condition of the soil.



[Sparrow

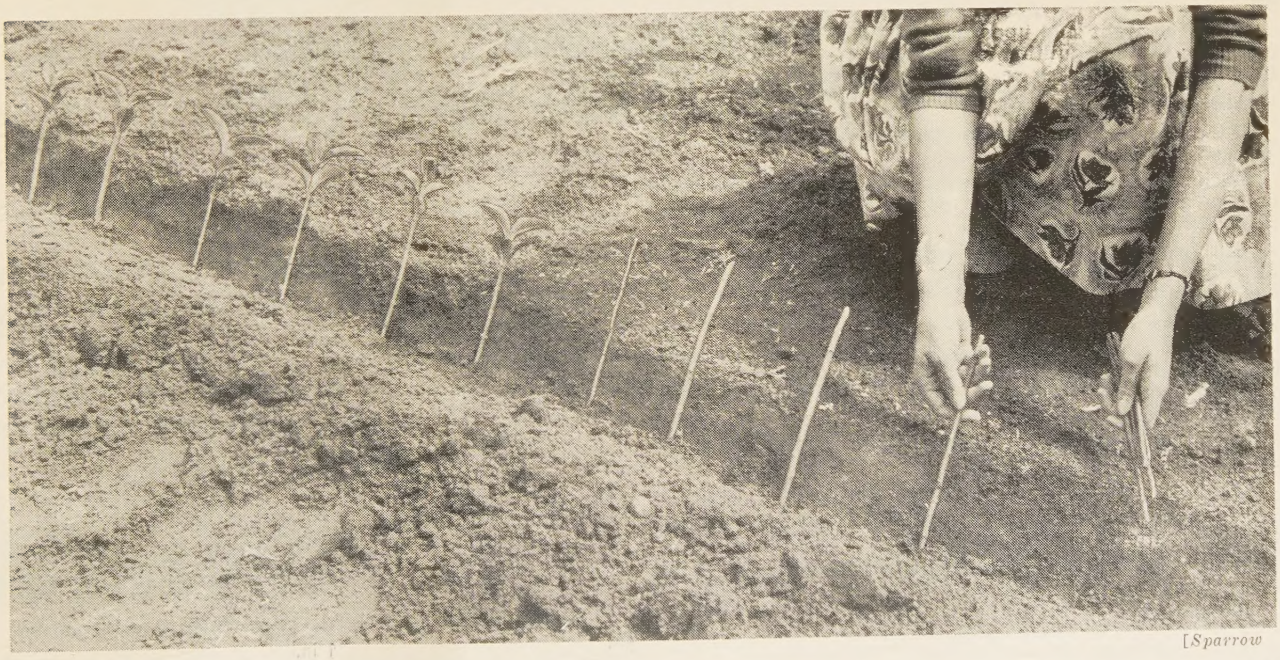
Many shrubs can now be propagated by taking cuttings from firm, well ripened stems of this season's growth. Remove any soft tips.

Floral Decorations

Warmer tones of flowers are more agreeable in the house as the days become colder. Any colour which has a tint of red or yellow in it—orange, purple, apricot, etc.—is more welcome than the colder blues, white, and green. As herbaceous plants are being cut back, any decorative seed pods should be selected. If some of these are still green, they can be dried by standing them upright in a container without water in a dark, airy position. They will retain some of their natural colour and so provide a variation from the common shades of brown.

Fern fronds and autumn leaves can be pressed between sheets of newspaper or under a carpet or weighted boards. Any overlapping sprays should be trimmed off. When firm and dry they can be stored in a box and brought out as required for decorations when flowers are scarce.

▼ Insert the cuttings to half their length in light, well drained soil. Firm well.

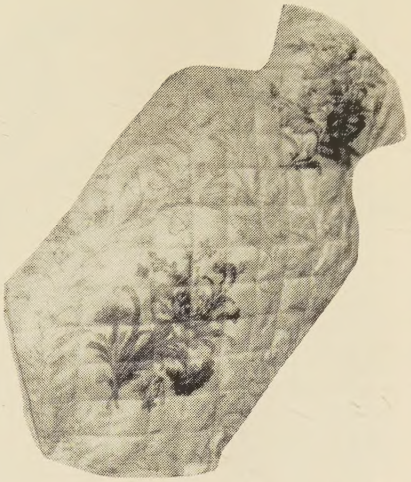


[Sparrow

A Quilted Hot Water Bottle Cover is Useful and Attractive

By JUDITH FERRIER,
Home Science Instructor,
Department of Agriculture,
Christchurch

THIS quilted cover for a hot water bottle made in a fabric to tone with the general colour scheme can make a charming bedroom accessory. It would also be a useful contribution to a sales table or could be put away for a Christmas or birthday present.



[Green and Hahn

MATERIALS needed are:

½ yd of 30 in. or 36 in. patterned cotton with a mercerised or satin finish. It may be necessary to allow more if a large repeating motif is to be centred on each side.

½ yd of butter muslin.

½ yd of dressmaker's wadding (¼ thickness only needed).

½ yd of lining taffeta in a colour to tone.

Quilting

Quilting is done before the pattern pieces are cut out as the process takes up some fabric. If a piece is cut out first and then quilted, it usually becomes smaller than the pattern from which it was cut.

Lay the patterned fabric right side down and cover the wrong side with the wadding. As a thickly quilted cover is not desirable, use only quarter of the original thickness of wadding. It will separate easily and cleanly.

Place the butter muslin on top and lightly tack around the edges to hold the layers together.

With the right side uppermost stitch in a 1 in. diamond pattern. Use the quilting attachment on the machine or tack in guide lines for accuracy in stitching.

Cutting out

There is only one pattern piece and a ½ in. seam is allowed all round.

Each square in the graph represents 1 in. Using the scale pattern as a guide draw the pattern shape out on paper ruled into 1 in. squares.

Cut two shapes from the lining taffeta and two shapes from the patterned fabric. Take care with the placing of any repeating motif.

To Make up

Take one piece of fabric and one piece of lining and with right sides together seam round ½ in. from the edge. Leave 4 in. open on one long side. Trim the seam and clip the curves to remove bulk.

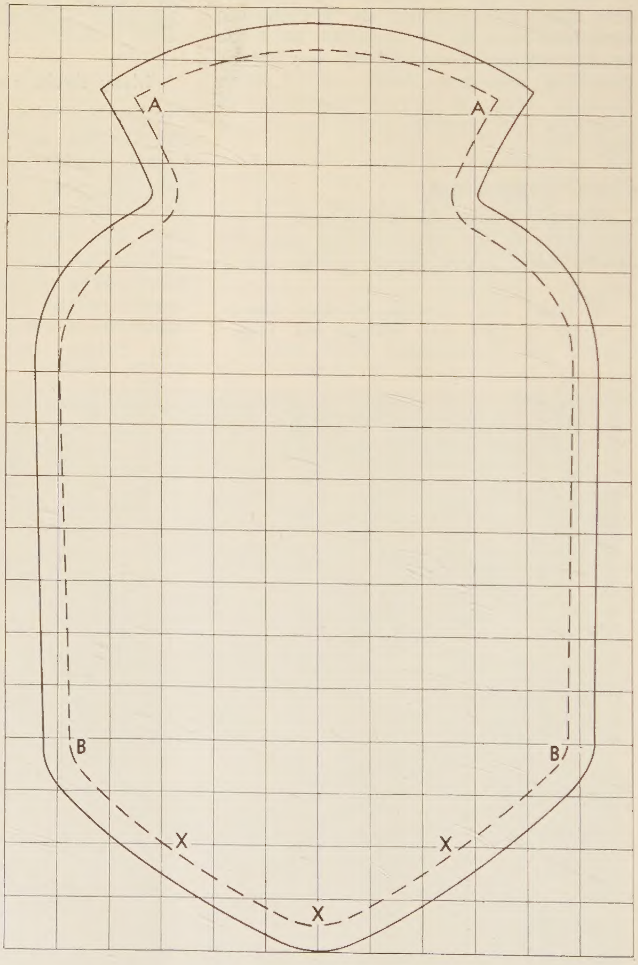
Turn right side out. Press the edges out flat and finish off the 4 in. opening by hand.

Make the other side of the cover similarly.

Sew domes on to the lining side of each piece as marked X in the pattern.

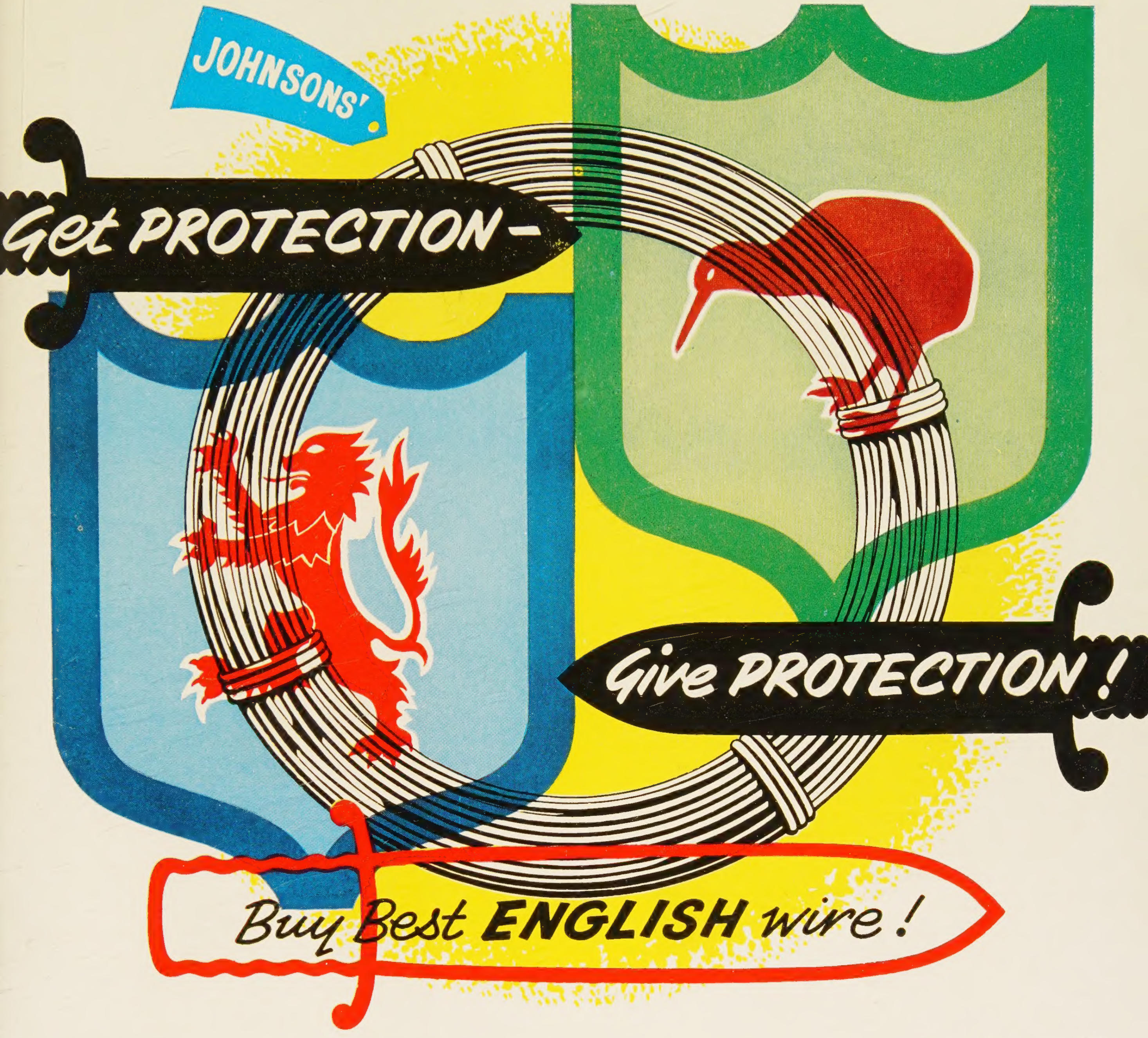
With the lining innermost overcast the two sides of the cover firmly together from A to B.

Press well.



Pattern for hot water bottle cover. Each square represents 1 in.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington.—1118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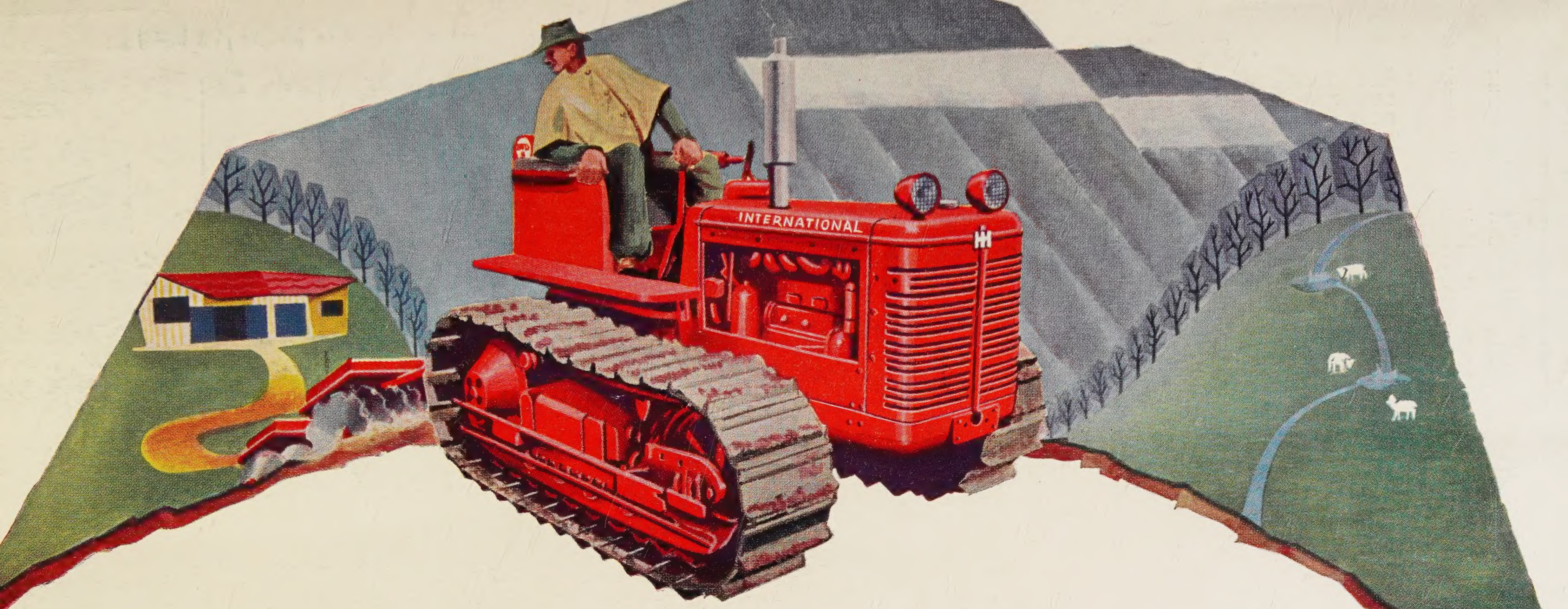

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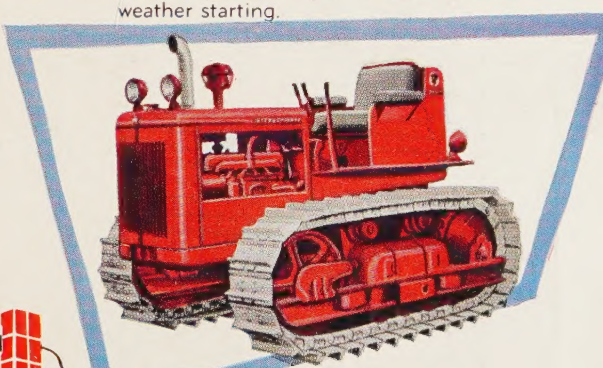

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